

THE CHANGING AGRICULTURAL GEOGRAPHY

OF SOUTHLAND 1878-1940

A thesis presented to
the University of Canterbury
in partial fulfilment of the
requirements for the degree
of Master of Arts in
Geography

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1970

Stacking Grain at the
Otamita Railway Station

- 1902 -

(photograph courtesy of the Alexander Turnbull
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TABLE OF CONTENTS

Frontispiece	1
Table of Contents	111
List of Figures	v
List of Tables	vi
List of Plates	vii
Acknowledgement	viii

CHAPTER ONE

Introduction

1.1 Historical Geography and Agricultural Change ...	1
1.2 Southland and the Dual Revolution	7
1.3 Methodology and Sources of Data	12

CHAPTER TWO

Southland On The Eve of Refrigeration

2.1 Southland - the Natural Environment	18
2.2 The Develepment of Agriculture 1840-1878	25
2.3 Southland Agriculture in 1880: The Wool and Grain Economy	33
2.4 Anticipation of Refrigeration - Changes in the Sheep Industry 1878-1882	42

CHAPTER THREE

Southland and the Refrigeration Revolution 1882-1906

3.1 Introduction	51
3.2 The Expansion of Settlement	53
3.3 Southland and the Develepment of the Frozen Meat Trade 1882-1906	61
3.4 The Dairy Industry - the Pioneer Phase	70
3.5 Oats - An Alternative to Refrigeration	78

CHAPTER FOUR

The Consolidation of Refrigeration 1906-1925

4.1 The Heyday of "High Farming"	87
4.2 The Frozen Meat Trade - An Era of Stability	93
4.3 The Spread of Dairying 1906-25	102
4.4 Oats - the Elimination of a Rival to Pastoral Farming	110

CHAPTER FIVEThe Culmination of Refrigeration 1925-1940

5.1	The Grassland Revolution in New Zealand	118
5.2	Sheep and the Grassland Revolution	124
5.3	Dairy Farming and the Grassland Revolution ...	135

CHAPTER SIX

Conclusions	141
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<u>Selected Bibliography</u>	145
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.....

LIST OF FIGURES

<u>Figure</u>		<u>Following</u> <u>Page</u>
1	Southland: Main Overseas Exports 1860-1940 ...	9
2	Southland: Surface Configuration	20
3	Natural Vegetation 1878	21
4	Number of Sheep per Acre 1880	35
5	Spread of Close Settlement 1878-1906	55
6	Frontiers of Settlement 1878-1896	56
7	Number of Sheep 1880-1915	61
8	Increase in Number of Sheep 1880-1890	65
9	Number of Sheep per Acre 1890	65
10	Increase in Number of Sheep 1890-95	66
11	Number of Sheep per Acre 1895	66
12	Decrease in Number of Sheep 1895-1905	67
13	Number of Sheep per Acre 1905	69
14	Location of Dairy Factories 1900	73
15	Acreages of Grain Crops 1880-1940	80
16	Outward Movement of Grain 1885	80
17	Outward Movement of Grain 1890	80
18	Outward Movement of Grain 1900	84
19	Outward Movement of Grain 1905	84
20	Number of Sheep 1905-1940	93
21	Number of Sheep per Acre 1910	95
22	Establishment of Dairy Factories 1900-1920	104
23	Cheese Production 1910-11	105
24	Cheese Production 1914-15	106
25	Cheese Production 1919-20	106
26	Cheese Production 1924-25	108
27	Outward Movement of Oats 1910	112
28	Outward Movement of Oats 1915	112
29	Grassland Revolution in New Zealand	122
30	Number of Sheep per Acre 1925	133
31	Number of Sheep per Acre 1930	133
32	Increase in Number of Sheep 1925-1930	134
33	Cheese Production 1930-31	137
34	Cheese Production 1936-37	138
35	Closures of Dairy Factories 1915-1940	139

Map Pocket - N.Z.M.S. 18, Sheets 24 and 25
(Invercargill and Dunedin)

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LIST OF TABLES

Table

1	Crops and Livestock 1871	29
2	Overseas Exports from Southland 1879-1881	38
3	Export of Oats from New Zealand 1879-81	41
4	Sown Grasses and Fodder Crops 1878-83	46
5	Net Migration 1878-1906	57
6	Percentage of Sheep by Flock Size 1880-1900	63
7	Destination of New Zealand Export of Oats 1889-91 and 1899-1901	83
8	Southland Farmers in 1905	91
9	Sheep Breeds in Southland 1900-25	97
10	Dairy Breeds in Southland	107
11	Destination of Oat Exports 1909-11	112
12	Tonnage of Grain Shipped Outwards from Bluff 1914-25	116
13	Increase in Livestock Units 1925-1940	121
14	Sheep Breeds in Southland 1925-1940	130
15	Percentage of thers and Dry Ewes in South- land 1920-1940	132
16	Output of Cheese Factories in Southland	139

.....

LIST OF PLATESFollowing
Page

Plate 1	The Introduction of Refrigeration	53
Plate 2	The Clearing of the Land	77
Plate 3	The Spread of Dairy Farming	102

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ACKNOWLEDGEMENTS

During the course of the preparation of this thesis, I received assistance from many sources. I am deeply indebted to all those who let me freely peruse their library shelves, ransack their office files, or gave me the benefit of their personal recollections of Southland agriculture. Special thanks must also go to my two supervisors. The thoughtful comments and guidance received from Dr R.G. Cant and Dr P.J. Perry did much to organize my thoughts and improve my writing. I would also like to acknowledge the financial help received from the Lester Fund and thank Mrs S. Thomas for the efficient typing of the final draft.

Needless to say, special thanks must go to all those organizations and individuals that tried to keep me sane during a trying period.

Roger Kellaway

October 28, 1970.

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CHAPTER ONE

INTRODUCTION

1.1 Historical Geography and Agricultural Change

A study in agricultural history is incomplete without a concurrent examination of the agricultural geography of the period. Of all economic activities, agriculture is the most intimately linked to the natural environment and changes in agricultural emphasis and technology are soon reflected in a different spatial organization of the land. The contribution made by historical geography to the understanding of problems in agricultural change lies in the different focus of geographical as opposed to historical studies. The geographer has a greater awareness of the spatial effects of changes and is more concerned with the varying responses of different regions to changing conditions. In addition, the application of the methods of geographical analysis often provides new insights into old problems. One of the particular contributions of historical geography is to balance reality against intent, to discover and revise a

number of the myths that have arisen through the failure of many historians to adequately consider the spatial factor.¹

There are perhaps three reasons why a historical geographer should consider the geographical impact of agricultural change in Southland. Southland is a unique area on the surface of the earth. Located at the southern extremity of the South Island of New Zealand, its remote location has made it "perhaps the least known of New Zealand's major agricultural districts".² Furthermore,

1. In two recent works, D.J. Wishart (1969) on the American frontier and R.C. Harris (1968) on the Seigneurial system in Canada show how historical geographic studies can discover historical "myths" through the study of the situation on the ground.
2. "Farming in New Zealand: Southland", N.Z. Journal of Agriculture, Vol. 79 (Aug, 1949), p.137.

the Southland province has a distinct physical and social character which in terms of settlement processes and land use patterns are more closely related to conditions in the North Island than to other districts of the South Island. A study of the agricultural changes which occurred in Southland over a period of sixty years will lead to a greater understanding of this particular region and will contribute to an eventual synthesis of the geography of agricultural change in New Zealand.

Secondly, it has been a major omission of historical geography in New Zealand to neglect the changes in agricultural orientation and production which took place after the turn of the century. The impact of refrigeration and the occupation of the land by settlement have been closely examined by historical geographers who are biased towards viewing New Zealand in a rural and nineteenth century framework.³ But the subsequent period of relative stability in the early decades of the twentieth century masks a number of important changes and innovations. These

3. P.J. Perry, "Twenty Five Years of New Zealand Historical Geography", New Zealand Geographer, Vol. 25 (October, 1969), p.103.

changes, taken within the confines of the traditional British system of agriculture were less spectacular and obvious than the process of initial settlement but represent an important stage in the evolution of the land-use system. The next stage, beginning in the mid-twenties has also suffered from neglect in spite of its fundamental importance. The grassland revolution was a New Zealand response to New Zealand conditions. Also neglected have been the two major periods of agricultural depression in this century which served as major stimuli to agricultural change. The study of some of these factors although limited to the Southland region will help to eliminate some of the broad gaps in the historical geography of New Zealand agriculture during the early part of the twentieth century.

Thirdly, the study of land settlement and agricultural change in an isolated province of New Zealand is closely related to changes that were occurring elsewhere in New Zealand and overseas. It is hoped that this study will be of more than local interest since it will attempt to relate developments within Southland to some of the major themes of the historical geography of the "new world".

R.C. Harris (1967) in a review of the nature of historical geography in Canada recommended that historical

geography in a "new world" situation should be concerned with a limited number of themes.⁴ The occupation of the land by settlement, the modification of European systems of agriculture and the impact of changing technology and new modes of transport are themes which serve to unite the historical geographies of countries like Canada, Australia and New Zealand.

These countries represent a stage in the expansion of the European world which took place between the seventeenth and nineteenth centuries. The establishment of a central focus of study and the available opportunities to make comparative studies of how groups of British settlers reacted to a whole series of new environments will eventually lead to the elucidation of the general patterns of European expansion overseas.

Developments in Southland did not occur in isolation but were part of world-wide patterns of progress, population movement and trade. As the barriers of distance were being eroded by technological progress in the nineteenth

4. R.C. Harris, "Historical Geography in Canada",
Canadian Geographer, Vol. 11 (October, 1967),
pp.235-245.

century, New Zealand became incorporated into a major commercial system. This system was centred on Britain though considerable contacts were maintained between some of the various regions making up the system such as the strong links between Australia and New Zealand. Inputs of innovation and changes in economic conditions in one part of the system had eventual repercussions upon all other parts. For instance, Britain was the heartland of the agricultural revolution in the early nineteenth century and the improved farming practices developed there were transferred to the "new world" where they were adapted to local conditions. By the end of the century; grain from the Canadian prairies, beef from the Argentine, mutton from Australia and dairy products from New Zealand were competing with each other to serve the same market in industrial Europe with grim effects on British farming.

The study of how one isolated part of this system behaved - of how it adapted the traditional methods of British agriculture to a situation where land was cheap but labour dear and the market twelve thousand miles away, forms the basic theme of this work.

1.2 Southland and the Dual Revolution

In 1843 Southland was a virtual wilderness, described by Tuckett, the Chief Surveyor of the New Zealand Company as "a mere bog, utterly unfit for human habitation".⁵ Within the span of one hundred years the landscape had been completely transformed. Not once but several times had a new geography been imposed upon Southland as a reaction to the changing balance of economic and social forces. In 1840 the land stood open and empty. In 1940 it was one of the most prosperous farming regions in New Zealand with an economy tightly integrated into that of a nation twelve thousand miles away.

The causes of this transformation are well known but their effects upon the land have not yet been fully examined. The invasion of the tussock was rapid in the 1860's but had relatively little impact on the landscape. The agricultural system of New Zealand reached a critical stage

5. Quoted in Cyclopedia of New Zealand Vol. IV Otago and Southland, (Christchurch, 1905), p.777.

in its evolution towards its present form in the last decades of the nineteenth century. The interaction of two factors, the large increase in overseas markets and the technological developments which enabled New Zealand to compete in these markets in spite of the handicap of geographical isolation, are generally accepted as the major causes of a revolution which began the transformation of the agricultural system of New Zealand into its present form.

That the impact of refrigeration caused changes in the fundamental structure of the New Zealand economy is undeniable. By overcoming the main problem that had hampered development prior to 1882 - the lack of markets - refrigeration provided an outlet for meat and dairy products and encouraged the spread and intensification of rural settlement. Before the advent of refrigeration the export staples of Southland (figure 1) had been wool and grain. These were the only products that could withstand the long voyages and heavy costs incurred in being transported to markets in Australia and Britain. The invention of freezing gave an impetus to an agricultural revolution in Southland. A few traces of the changes known as the "refrigeration revolution" can be found prior to 1882 as a number of farmers had anticipated the technological developments that would permit the export of frozen meat and dairy products from the antipodes to the home market.

The adjustment of agriculture in Southland to the new economic conditions was a complex process. It occurred at a number of different scales and was neither contemporaneous nor universal over the entire district. Grain farming continued to expand and remained an important rival to refrigeration until 1910. Furthermore, it cannot be said that the adjustment to refrigeration was complete until the late 1920's when a second fundamental revolution took place. The first revolution was one involving a new mode of transport; the second involved a new concept in agricultural production. While South Island enterprise was involved in working out the methods of refrigerated transport of perishable animal products, another group of New Zealanders working in the Waikato were experimenting with grassland farming in order to produce these foodstuffs as cheaply as possible.⁶

The diversification of the staple trade and the growth of the rural economy can be subdivided into four basic periods by examining the nature and value of exports from

6. J.M. Miller, "Topdressing", N.Z. Journal of Agriculture, Vol. 75 (July, 1947) p.19.

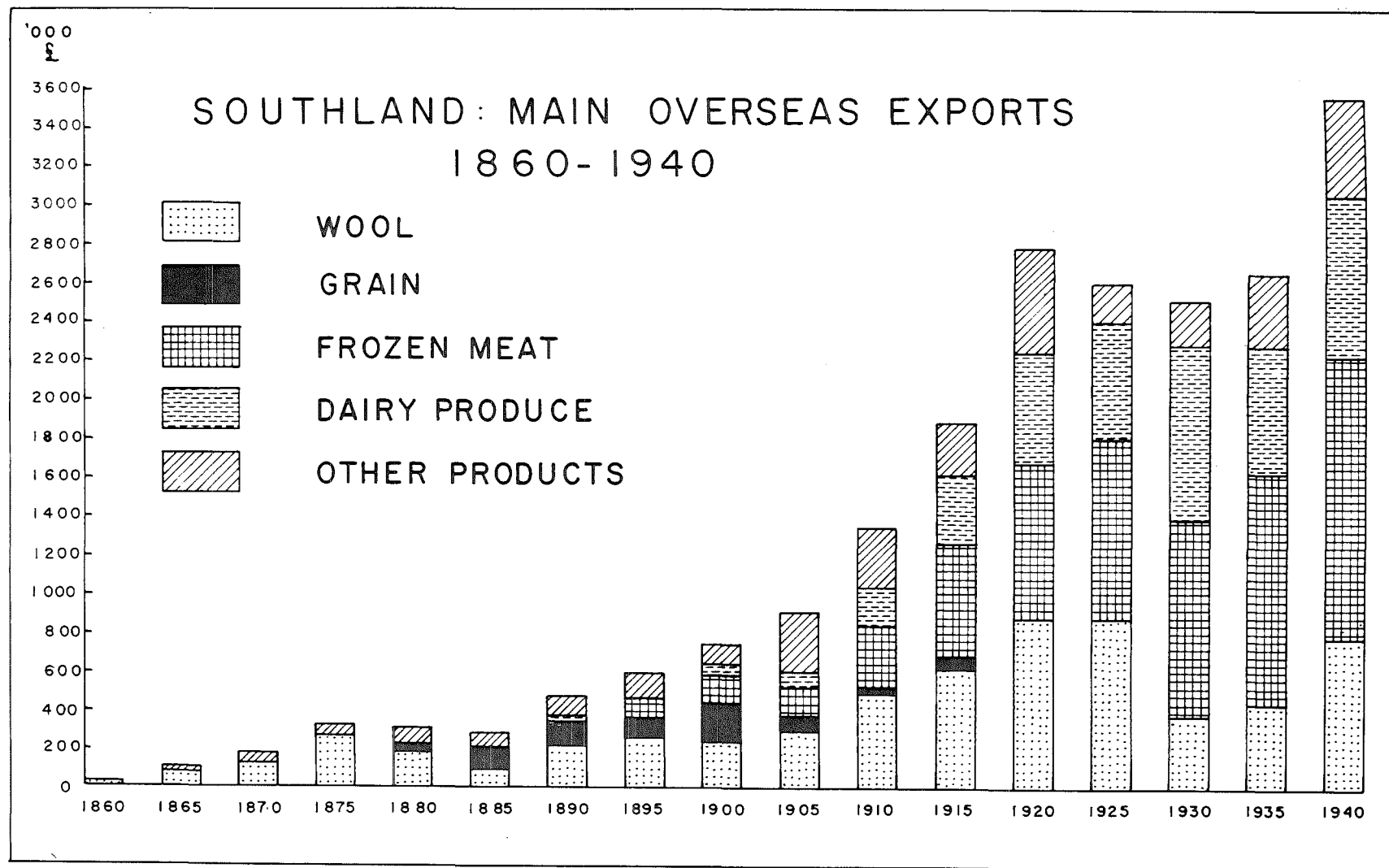


FIGURE 1

Southland ports.⁷ It must be remembered that there is

7. This diagram of exports from Southland ports was compiled from the port returns contained in four different sets of statistical publications.

- (a) 1860-1885, "Trade and Interchange", Statistics of the Colony of New Zealand.
- (b) 1890-1910, "Imports and Exports", New Zealand Gazette.
- (c) 1915-1925, "Principal Exports", Monthly Abstract of Statistics.
- (d) 1930-1940, Trade and Shipping Statistics.

Other products are primarily agricultural (sheepskins, preserved meats, grass seed etc.) except that gold was important in the nineteenth century. The strong influence of inflation exaggerates some of the trends but value is a better criteria of the structure of farming than volume.

considerable overlap between periods. Events did not take place simultaneously over the entire region and the divisions between them are in the nature of transition zones and not sharp boundaries.

(a) The Pre-Refrigeration Era (1860-1882).

During the age of extensive pastoralism, wool became the dominant export staple. As wool prices began to decline in the late 1870's a greater flexibility was introduced into the agricultural system of Southland. There was an intensification of pastoral production using sown pasture rather than natural grasslands and also a swing towards greater grain production.

(b) The Refrigeration Era (1882-1906).

The slump in prices and the declining production of wool led to the opening up of new markets by the use of refrigerated transport. Growing amounts of dairy products and frozen meats were exported. Grain farming survived and even expanded as an alternative to refrigerated farming.

(c) The Era of "High Farming" (1906-1925).

This was a period when the Southland agricultural system continued to exhibit the best and the worst features of British farming. But the application of more of the principles of "high farming" and the continual rise in prices

led to vast increases in the value and volume of exports.

(d) The Grassland Revolution (1925-1940).

The introduction of a new style of farming increased the output of pastoral products though the pattern is distorted by the influence of the Depression. Rather than the expansion of the range of staple exports which characterized previous periods, the trend was towards the concentration upon the production of fat lamb. During this period, Southland farming entered a stage of agricultural maturity and specialization.

The switch from the traditional British methods of farming to a system of intensive grassland farming led to a vast increase in output. These changes allowed the farmer to take full advantage of the marketing possibilities that had been developed in the 1880's by refrigeration. In a sense, grassland farming represents the culmination of the refrigeration revolution and the present agricultural pattern of Southland is a result of the interaction of the "dual revolution" - of refrigeration and grassland farming.

1.3 Methodology and Sources of Data

If historical geography is to maintain a position of respect, it must face the threat of a growing technological

obsolescence that threatens to turn the field into a geographical backwater. For although the general concept of historical geography introduces the additional complexity of the third dimension of time to an already complex phenomenon location matrix⁸, the methods of studying a problem in historical geography are not intrinsically different from the methods of examining a problem in economic or social geography. By adapting the principles and methods of modern geography to problems in an historical setting, the threat of redundancy can be faced and overcome. It is a lengthening of the time dimension of modern concepts of economic geography that will restore historical geography to a prominent position as a major field of geography.

In a country of recent European settlement and a vast amount of untapped geographical data, the application of

8. R.G. Cant, "The Dilemma of Historical Geography", in W.B. Johnston, ed. Human Geography: Concepts and Case Studies, (Christchurch, 1969) pp.40-60.

geographic rather than historical or anthropological techniques will be the most effective manner in which the geography of past periods can be reconstructed. From these reconstructions, trends and changes can be discovered and analysed. Part of the aim of this thesis will be to utilize a geographic approach to the vast amount of data which exists concerning the development of Southland agriculture over the sixty years from 1880 to 1940.

Although there has been a considerable amount of research by historical geographers into the agricultural evolution of New Zealand, the nature of the data makes it difficult to reconstruct patterns of agricultural intensity at an intermediate scale such as a province or a land district. In order to understand the dynamic forces that initiate and control changes in agricultural systems, it is necessary to consider their effect on the land. The national or island scale is often too large while the local studies become too involved in detail unless they are related to a general theme.

The statistical data available for a study of agricultural change is immense. Indeed, there even may be a data paradox where there is more readily available data for the past than there is for the present. The limitations of Census data and the Agricultural and Pastoral Statistics,

the basic primary sources for any inquiry into the New Zealand past are well known. Every year, detailed statistics were collected on agricultural output, crops and livestock but there are two major faults that detract from the usefulness of this material. The Agricultural and Pastoral Statistics do not contain details on farm inputs (of labour, capital, feed, fertilizer etc.) and thus only reveal the broadest general patterns of the economic structure of farming. The overwhelming deficiency of the statistics is the lack of a suitable geographic base for their publication. No published or available unpublished returns refer to areas of less than a county. Statistics which in many other countries are collected for minor civil divisions and are frequently available for even smaller areas are in New Zealand limited to a level of data amalgamation which is too large to show the important regional variations in production which occur in Southland.

To overcome this deficiency has been a secondary aim of this thesis. A.H. Clark's study of Prince Edward Island, Three Centuries and the Island has illustrated the value of comparing agricultural statistics for small areas in order to reveal the variations in production and the trends which took place through time. By cartographic manipulation of the available data, an attempt is made to produce a series

of maps showing the spatial intensity of agricultural production at different periods and to trace the varying regional responses to changes in economic conditions.

In order to examine the regional patterns of agricultural production at a sub-county level, it was necessary to use a number of different sources of data. Data concerning the production of individual dairy factories came from the Annual List of Creameries, Factories, Private Dairies and Packing Houses, details on the distribution of sheep from the Annual Sheep Returns and on the production and movement of grain from railway station statistics published annually by the Railway Department. Records of the Valuation Department in Invercargill were used to reconstruct the value of farm lands at different periods.

While the maps prepared from the above sources may have a number of inherent defects which limit their usefulness, it is believed that some sort of quantitative statement on the internal regional variations in agriculture is nevertheless, valuable. A region as diverse as Southland cannot be treated as a homogeneous area. The mapping of the intensity of production at intermediate scales can show how different areas of the province reacted to changes in the structure of the farming economy and may cast light upon

some of the processes involved.

It is unfortunate that the data allows the three main types of agricultural activity (sheep, dairying and grains) to be studied separately but not in combination. Separate study of the individual parts of the system conveys an inadequate impression of the mosaic that makes up the total system. The methods were too crude to allow the creation of multiple crop and livestock regions or the plotting of significant ratio's between the various criteria but were extremely useful in showing the patterns of intensity of each of the three main agricultural pursuits.

Once the areal patterns were established, it was necessary to consult a large number of other sources in order to finalize a chronology and explain the trends already noted. Local newspapers, the evidence presented to various Royal commissions, local histories and personal conversation with some of the participants of the later stages of the dual revolution helped to bring the situation more clearly into focus.

The patterns of intensity represent the work of processes and it is the aim of this study to explain the patterns of agricultural intensity in Southland in terms of the forces that led to their creation.

CHAPTER TWO

SOUTHLAND ON THE EVE OF REFRIGERATION

2.1 Southland - the Natural Environment

It appears to have been a tradition among early visitors to the Southland coast to stop at Awarua Harbour and climb the hill known as the Bluff. From this vantage point, they could see beyond the dismal barrier of forests, swamps and sand dunes that occurred along the coast and look out over the Southland plains. Looking to the north "the eye wandered over vast plains, apparently of grass and low scrub terminated in the distance by lofty hills" while to the northwest were visible "the white summits of very distant snow capped mountains."¹

This comment is typical of many of the early glimpses of the interior of Southland. The garnering of geographical knowledge about the backcountry was a slow process. The sealers and whalers had interests that did not extend far

1. Edward Shortland, The Southern Districts of New Zealand, (London, 1851), p.146.

inland and although knowledge about the coastline advanced fairly rapidly, it was not until the 1840's and the search for New Edinburgh that the attention of the Europeans turned towards the interior.

The appraisal of the natural environment made by the early explorers and pioneers is often more important than reality. The concepts upon which they worked may have been illusory, a misunderstanding of the potential and problems of a novel landscape but it is these illusions which are responsible for the subsequent patterns of land use and settlement. A consideration of the natural environment must strike a balance between how it was perceived and how it actually exists.

The initial appraisals of the land and its suitability for agricultural settlement tended to be very dismal. As experience accumulated about the New Zealand environment and as the main focus of attention shifted from arable to pastoral uses, these evaluations gradually changed. The Australian whalers who frequented the Southland coast in the 1820's and 1830's did not consider the area suitable for either agricultural or pastoral settlement due to the frequent gales and the heavy rainfall.² Tuckett and Monro in 1843 had rejected

2. A.H. Clark, The Invasion of New Zealand by People, Plants and Man, (New Brunswick, 1949), p.54.

the Southland plains as a site for New Edinburgh arguing from a number of premises which cast interesting light on the contemporary geography of Southland on the eve of settlement and upon its appraisal by the early pioneers.

The main contrast in the pre-settlement geography of Southland was between the forested fringe along the coast and the natural tussock grasslands of the backcountry (figure 3). From Chaslands Mistake to the Waiau ran a belt of forests varying in width and composition according to climatic conditions. The podocarp element (matai, rimu, totara and kahikatea) was strong in the eastern regions of the Catlin ranges and on the plains but was increasingly replaced by beech as climatic conditions became harsher further inland and to the west. Beech forests were dominant on the inland side of the forest zone on the plains and remnants of a previously much extended forest zone were found on the southern slopes of the Hokonui hills and the Takitimu mountains. The mountainous, beech covered slopes of Fiordland set an obvious western limit to the regions that had any potential for settlement.

Inland of the marginal forest zone lay a transitional fringe of parklands which merged into the tussock grasslands of the plains and downs of the interior. On the plains, swamps and bogs were common because of the imperfect drainage

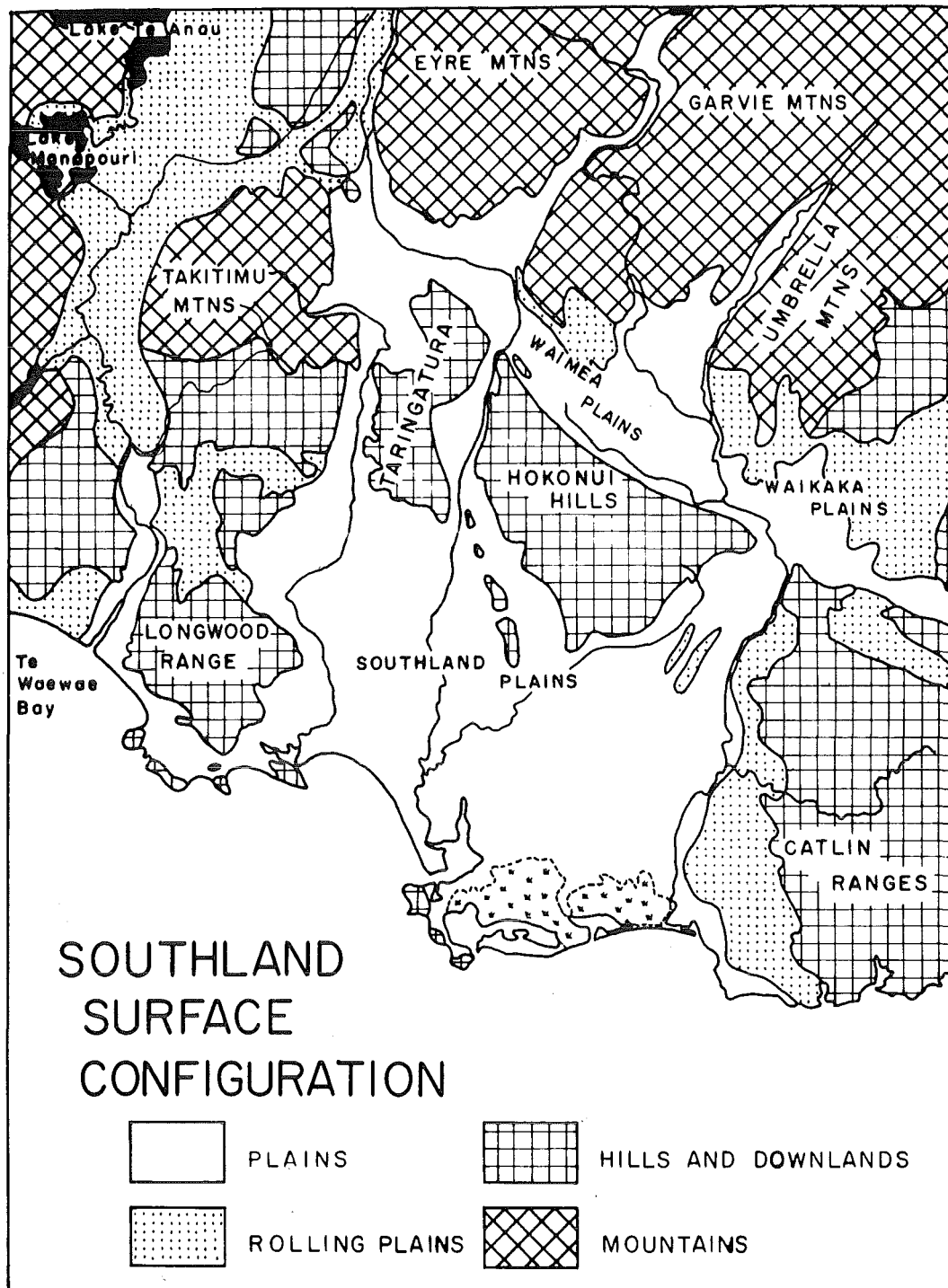


Figure 2

of the flat or slightly undulating surface so that extensive areas of fern, flax, manuka and other shrubs were common. One comment at a later date but applicable to the pre-settlement era stresses the novelty of these regions to people used to British scenery. Interior Southland would be pretty, he said "were it not that the grass was yellow and that there was little timber of any description; nothing but occasional cabbage trees and flaxbushes to relieve the eye".³

Tuckett had found "a large plain in the south but that the soil with the exception of the swampy land on the banks of the great rivers was not as fruitful as that in the neighbourhood of Otago".⁴ On the basis of the common pioneer technique of using vegetation as a guide to agric-

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- 3. J.A.H. Caird, Notes on Sheep Farming in New Zealand, reprinted from Agricultural Gazette (Scotland) 1874.
 - 4. J.F. Wohlers, Memories of the Life of J.F.H. Wohlers, (Dunedin, 1895), p.107.

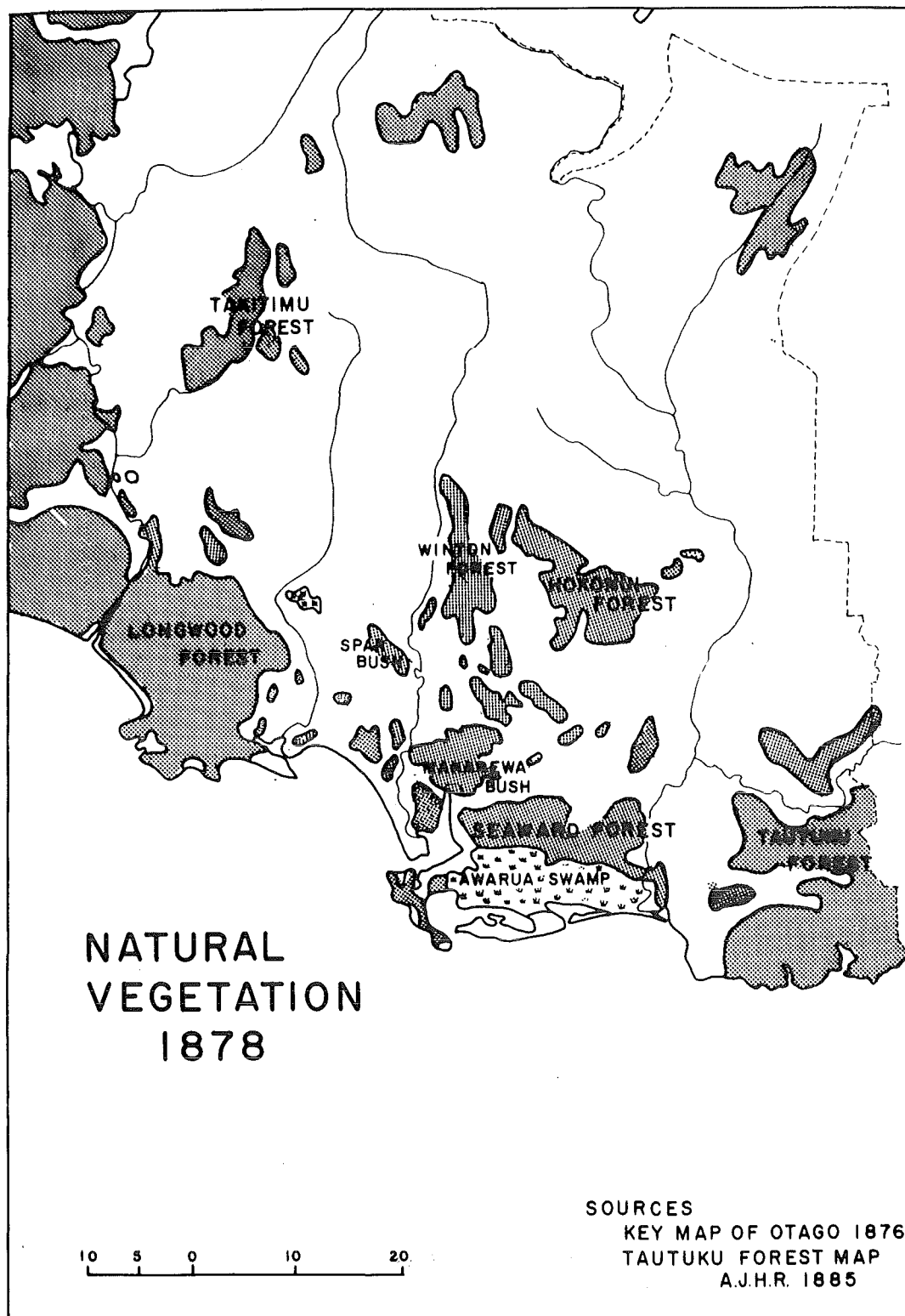


Figure 3

ultural suitability, a number of comments were made upon the Southland environment. The heavily forested areas near the coast were examined and by linking the predominance of podocarp trees to a lack of natural fertility, he rejected this area as unsuitable for settlement.⁵ Moving inland onto the plains beyond the forest margin, Tuckett still remained unimpressed. The rolling plains of the Aparima valley may have looked superficially good for settlement. The parklands were commended for their beauty with the "fine groves of timber resembling the backwoods of England"⁶ but the prairie grass "affords scarcely any food for cattle"⁷ and even those grazed on better grass near the sea "gave scarcely any milk, not more than a good goat, well fed".

5. "Mr Tuckett's Diary" as Appendix A of T.M. Hocken, Contributions to the Early History of New Zealand, (London, 1898). p.223.

6. ibid. p.223.

7. ibid. p.224.

Finally, the Southland climate, cooler and moister than other regions of the South Island was condemned. The cold was excessive and the frequent occurrence of rain was believed by Tuckett to reduce the number of potential working days by twenty-five percent compared to other regions in the South Island.⁸

Dr. Monro, Tuckett's chief assistant examined the Waihopai plains and confirmed the general impression that Southland was unsuitable for settlement. He noticed that the quality of the land, seemed to improve as one moved inland from the coastal fringe of extensive sand dunes and swamps onto the higher levels of the fan surface and terraces making up the plains. Yet, he also stressed that the "wire grass" which was found in the parkland zone was an imperfect and unsatisfactory food for sheep and cattle.⁹

During the 1850's, New Zealand began to experience a rapid expansion in extensive pastoralism leading to a reappraisal of the value of Southland. While Tuckett and Monro had considered the land from the viewpoint of the small

8. ibid. p.224.

9. D. Monro, "Notes of a Journey through a Part of the Middle Island of New Zealand" in T.M. Hocken, Contributions to the Early History of New Zealand, (London, 1898), p.252.

arable farmer, their successors of the 1850's evaluated the land in terms of its potential for extensive grazing. J.T. Thomson, Chief Surveyor of the Otago Government stressed that the parklands were eminently suitable for arable farming while the plains, especially the Waiaua, Waimea and Mataura districts and the rolling downlands of the Hokonui, Otarua and Taringatura ranges were first class natural pastures.¹⁰ Almost everywhere, Thomson considered that the pastures were of the highest quality although frequently overgrown with spear grass, fern, flax and tutu; all of which could be removed by firing the tussock.

The settlement of the land suitable for extensive pastoralism was rapid but this period of development had relatively little effect on the landscape. In 1878, the

10. J.T. Thomson, "Extracts from a Journal kept during a reconnaissance survey of the Southern Districts of the Province of Otago", in N.M. Taylor, ed., Early Travelers in New Zealand, (Oxford, 1959), pp.325-348.

natural landscape of Southland was much the same as it had been thirty years earlier. The pattern of mountains, hills and plains were of course constant; the climate and the soil were also fixed factors. A limited amount of bush clearing, cultivation and fencing had occurred in the park-land zone but these changes were minimal compared to those predicted for the immediate future. The land had been viewed in turn by those interested in arable farming and the pastoralists. Now it was again to be viewed in terms of its suitability for more intensive farming.

2.2 The Development of Agriculture 1840-1878

Over a period of thirty years following the importation of the first flock of sheep, the extensive pastoral industry in Southland passed through an era of expansion and a subsequent period of depression and decline. Although an exhaustive survey of the development of the great pastoral runs is beyond the scope of this work; it is necessary that a brief examination be made of the major trends in the evolution of the agricultural system prior to 1878 so that later changes can be set within their historical context.

Maori agriculture with its limited range of crops was not successfully carried out beyond South Canterbury and consequently the native peoples of Southland lived by hunting, fishing and gathering. The first Europeans in the

area were the sealers and whalers who introduced the potato to the Maoris of the Southland coast in order that supplies could be provided for shipping in southern waters. As the industry began to decline in the thirties, a number of former whalers abandoned the sea and settled permanently along the coast.

Agriculture at the whaling stations (of which there were five along the coast) was primitive but commercially oriented from its beginnings. Wheat and potatoes were grown for local consumption with high yields more indicative of the fertility of the soil than of any farming ability on the part of the ex-whalers. A considerable number of half-wild cattle provided meat for the local settlement, for the few remaining vessels and after 1848 were exported to Dunedin to provide the new Otago colony with stock.

In the 1850's pastoralism began to spread throughout the South Island and the attention of the ex-whalers turned more towards the land. In 1853, Captain Howells of Jacobs River imported the first flock of 450 sheep from Australia and several other ex-whalers took up runs in the tussock country back from the sea. Being of English origin and knowing little of the problems and methods of extensive pastoralism, this original nucleus was soon augmented by an influx of Scots, usually having experience of pastoralism

in Australia and who were capable of organizing an extensive pastoral industry in a frontier region.

The occupation of the land suitable for extensive pastoralism was fairly rapid under the impetus of high wool prices during the 1850's and 1860's. An aspiring runholder under the Otago regulations would inspect the waste lands, select a block and obtain a lease from the provincial government. The leases were for a period of fourteen years although they could be cancelled if the land was needed for closer settlement. This was not a major obstacle in Southland since extensive pastoralism was the only practical use of the tussock grasslands at this stage of development. J.A.H. Caird (the eldest son of James Caird, prominent British agricultural expert and author of English Farming in 1850-51) concluded after a lengthy stay in the province in the early 1870's that "this part of New Zealand generally is not well adapted for the pursuit of agriculture. There are little patches along the coast and valleys here and there where the soil is good and where arable farming may be profitable but there are great extents of mountains, uplands and gravelly plains that would not pay to cultivate in England, much less therefore in New Zealand."¹¹ If by any chance a runholder

11. J.A.H. Caird, op.cit., p.31.

felt threatened by the encroachment of settlement, it was a relatively cheap process for him to obtain the freehold of the best lands on the run.

A number of small farms had been established in the transitional parkland zone around Wallacetown to exploit the markets opened up in Invercargill and Central Otago during the gold rushes. The expansion of small farm settlement was slow. The costs of clearing and fencing were high, the market limited and the agricultural techniques primitive. Oats was the main crop in the small farm economy and according to Caird the general level of farming was very bad. Four or five crops of oats were taken from the land without the use of manure and then the land was given a rest in English grasses and weeds.¹² The use of green crops, rotation or manures was not observed and as New Zealand could not compete against the American prairies as a source of grain, there was little incentive for small farm settlement to expand from the core region north and west of Invercargill onto the tussock grasslands.

The early runs in Southland were stocked by a mixture of sheep and cattle. Sheep were preferred because there

12. J.A.H. Caird, op.cit., p.8.

was an export market for wool and tallow but cattle were a strong and vital ingredient in the livestock pattern of this region (table 1). Cattle could adapt to the poisonous tutu plant that infested the pasture more readily than sheep and in many regions a mixture of sheep and cattle in the pasture was necessary to preserve and improve the quality of the grass.

TABLE 1

Crops and Livestock 1871¹³

	<u>Oats</u> (acres)	<u>Cattle</u>	<u>Sheep</u>
Wakaia	831	7,640	412,016
Mataura	4,750	18,369	107,776
Riverton	6,188	13,226	25,202
Wallace	200	9,485	734,491

The cattle and sheep in Southland were either purchased

13. "Agricultural Statistics-23B" and "Livestock-25,
Census of New Zealand, 1871.

in Otago and driven overland or imported direct from Australia and then trekked across country to the runs. The ultimate Australian origin was reflected in the type and quality of the breeds of sheep and cattle. The sheep were predominantly merino while the cattle were an unspectacular mixture of Durham, Aryshire and Shorthorns. These were not the oil-cake stuffed beasts of the English shows but half-wild scrub cattle. Much of the later agricultural progress of Southland was hampered by the need to eliminate from sheep and cattle breeds much inferior material, often not suited for local conditions.

A world depression in the mid-1870's brought a halt to the period of expansion. From 1862 to 1876, the export of wool from Southland ports had increased by more than twenty times; from 251,000 lbs to over 5,000,000 lbs.¹⁴ Then it began to decline. Low prices for wool, the disappearance of the market for surplus stock along the frontier and the invasion of rabbits caused the extensive pastoral industry of Southland to pause and consider the future pattern of growth.

The invasion of the rabbit which had begun to spread from Invercargill in 1865 was an important factor in this change since the reduction of carrying capacity made exten-

14. "Quantity and Value of Exports from the Several Ports"
New Zealand Statistics, for 1862 and 1876.

sive pastoralism impossible under the current low prices for wool. The effect of the rabbits were not regarded as serious until the mid-1870's when stock numbers began to fall. Two stations in Southland serve to illustrate the drastic effect of the rabbit, backed up by burning and overgrazing, on the carrying capacity. Between 1875 and 1878, Burwood station in the Mararoa country declined from 82,000 to 30,000 sheep and the Waimea Plains station saw its flocks reduced from 53,000 to 37,000.¹⁵

As a result of the difficulties of the mid-seventies, it became clear that the day of extensive pastoralism was drawing to a close over large parts of Southland. Runholders began to consider the alternatives to extensive sheep and cattle farming. Until this date, Southland had been regarded as more suitable for pastoral than for arable farming but the assessment of the land was in a state of flux and about to change for a third time. The optimists of the day considered the heavy and sour soils of the plains and felt that they offered great scope to thousands of small farmers who would

15. P.R. Stevens, "The Age of the Great Sheep Runs 1856-80", in R.F. Watters, ed., Land and Society in New Zealand, (Wellington, 1965), p.58.

"carry on a mixed system of husbandry in a similar manner to that prevailing in the best districts of Scotland."¹⁶

A number of large firms such as the New Zealand and Australian Land Company and the New Zealand Agricultural Company began to acquire vast tracts of land which they hoped to work as a combination of sheep run and grain farm though the ultimate aim was to sell the land to small farmers at a handsome profit. For it was apparent that a combination of economic and technological forces were going to change the basic orientation of Southland agriculture within the next few years. Low prices and a declining production of wool, and overseas experiments in refrigeration established two divergent trends in the agricultural history of Southland. For the next three decades, the interplay between the competing forces that would make Southland into an arable grain farming region and those that would turn it into an intensive sheep and dairy farming area determined the course of developments.

16. Information Regarding the Freehold Lands in New Zealand offered For Sale by the New Zealand and Australia Land Company Limited, (Edinburgh, 1882), p.16.

2.3 Southland Agriculture in 1880: The Wool and Grain Economy

In 1880, the agricultural system that had developed during the age of extensive pastoralism was in a state of disarray. The basic problem of the period was the low value of the sheep. Wool was the only product with a steady market and wool prices had been falling from a peak of 18.4 pence per pound (1873) to under a shilling in 1880.¹⁷ The pastoral industry might have been able to adapt to the slump in price of wool, as it had adapted to the price fluctuations caused by the resumption of cotton exports from the American South in the late 1860's except that the impact of falling prices was exacerbated by falling production.

17. Prices of commodities have been calculated from the statistics on the "Quantity and Value of Exports at the Several Ports", given annually in the New Zealand Statistics. In the case of wool, Southland produce received a considerable premium above general N.Z. price.

An examination of the export statistics from Invercargill and Bluff show that in 1880, the total value of wool cleared for overseas export was £185,000; a rather steep drop from the £293,000 received in 1876 and the trend of exports was steadily downwards. No industry could long survive such a drastic decline in profitability. The declining revenue from wool was partly compensated for by the exports of rabbit skins and by lower labour costs but it was increasingly apparent that the basic agricultural orientation of Southland would have to adapt to changing economic circumstances.

Agricultural depression has frequently acted as a major stimulus for agricultural progress and change. In 1880, the wool industry was collapsing and Southland farmers were faced with two alternatives. They could either anticipate the effective implementation of refrigeration which would create a new type of sheep industry in Southland based on meat as well as wool, or they could change the emphasis in land use from pastoral to arable farming. All through the pastoral districts of the South Island, the competitive position of grains was increasing and a system of agriculture known as "bonanza wheat farming" was being developed.

In order to put the situation in 1880 into perspective, the wool and grain economy of the period must be examined

more closely. The situation in the sheep industry in 1880 was not stable as a number of important changes were in progress. A study of the distribution and density of sheep in different parts of the province can give a valuable guide to the structure of the extensive pastoral industry on the eve of refrigeration. A map showing the number of sheep per acre (figure 4) in 1880 shows that there were three regions of Southland where the style of pastoralism was semi-intensive (two acres to the sheep) while semi-extensive and extensive pastoralism was dominant over most of the remaining areas. The plains north of the Hokonui hills running from the Otago border to Mossburn can be considered to be the prime pastoral region of Southland at this period. The 120,000 sheep of the New Zealand Agricultural Company plus large flocks of over 20,000 sheep on a number of private runs (Waikaia - 26,040, Waikaka - 22,000, Five Rivers - 22,000, Castle Rock - 28,050) made the Waimea plains and the adjacent valleys and downlands the dominant sheep producing region. There were two outlying areas where sheep densities reached fairly high levels. The Edendale district contained the estates of the New Zealand and Australia Land Company and the mid-Waiiau plains were grazed by the large

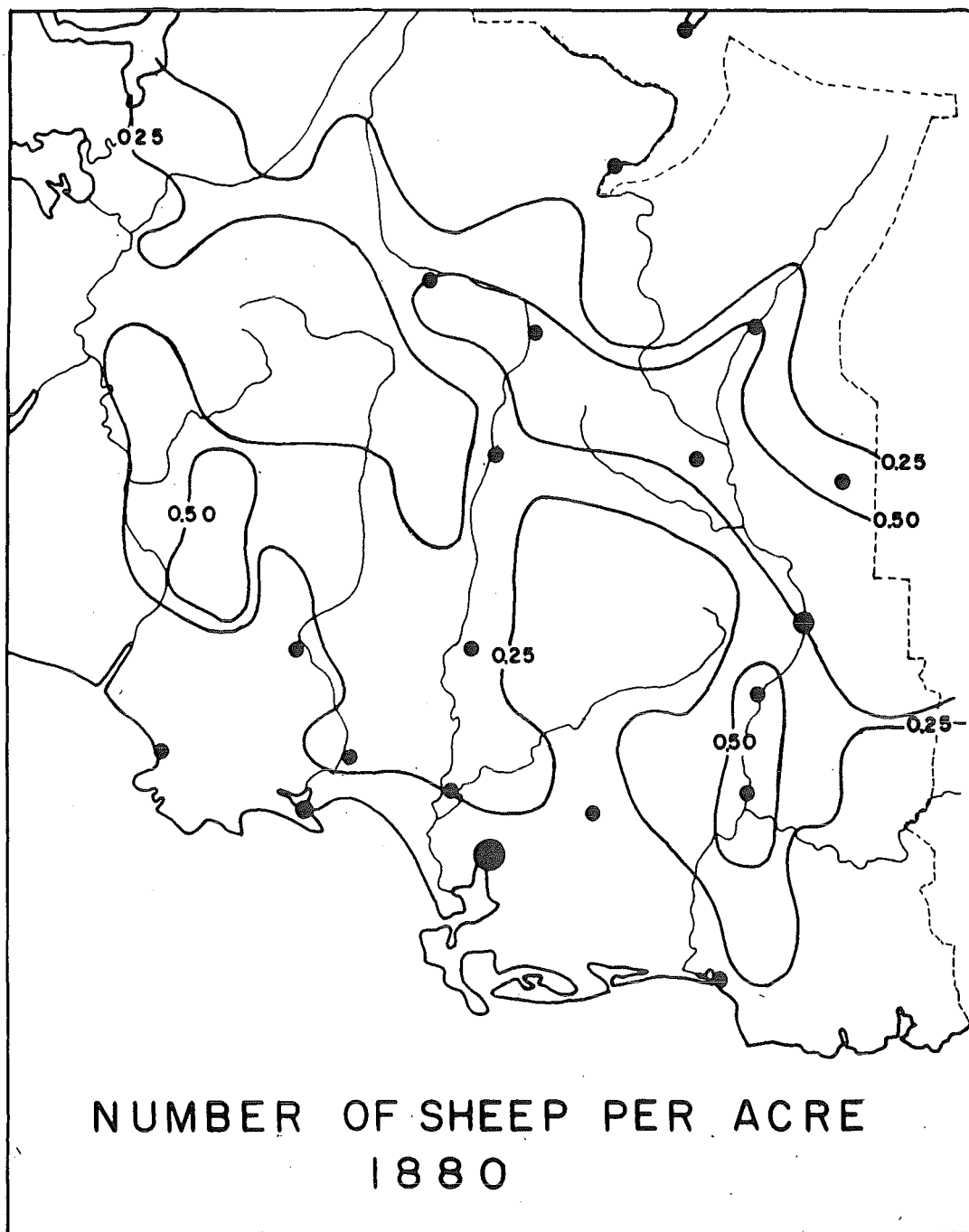


Figure 4

flocks of the Mount Linton and Merrivale runs.¹⁸

Since the Merino sheep was the dominant breed of the period, sheep raising was widely dispersed over the open grasslands of the interior of Southland. The number of acres per sheep may have been high but the sheep was a ubiquitous element of the landscape of the tussock grasslands. But the merino was very susceptible to footrot and could not be grazed successfully on the more humid and frequently swampy plains south of the Hokonui hills nor along the bushland fringe. There were a number of large runs in these areas, often with flocks of Lincolns and Leicesters but sheep densities were not great in 1880 and the New River, Winton and Invercargill Hundreds were being increasingly settled by small farmers who had little inclination towards sheep.

In 1880 the flocks of Southland were dominated by

18. The map and the figures for sheep on the various runs were prepared from "Livestock and Rabbits", A.J.H.R., (1882), H7c. These are a revision of the original 1880 data given in the Appendices for that year.

the large company and proprietorial runs. The sheep returns reveal the narrow base of sheep ownership in Southland before refrigeration. There were 383 flockowners. Of these, a mere forty-eight owned flocks larger than five thousand sheep and these large flocks constituted 80.6% of the total provincial flock. Small farmers owning less than one thousand sheep had control of only 8.8% of the total number of sheep and most small farmers did not own (or did not report owning) any sheep at all.¹⁹

The export trade data for Southland ports can give a picture of the range of Southland agriculture around 1880 (table 2). The value of wool exports was declining rapidly though counterbalanced to some degree by exports of rabbit skins. During the previous few years, grains had been developing into a secondary staple product with a considerable overseas trade plus local shipments to the North Island.

19. Calculated from "Livestock and Rabbits", A.J.H.R.
(1882), H7c.

TABLE 2

Overseas Exports From Southland²⁰1879-1881

	<u>1879</u>	<u>1880</u>	<u>1881</u>
	£	£	£
Wool	230,000	185,000	152,000
Oats	31,700	26,400	32,300
Rabbit Skins	21,100	32,020	20,150
Wheat	7,990	3,050	9,960
Barley	2,100	4,610	3,280
Preserved Meats	3,490	4,960	1,960

While "bonanza grain farming" in Canterbury had concentrated on wheat, climatic limitations and a possible cultural preference of the predominantly Scottish farmers

20. "Quantity and Value of Exports at the Several Ports,"
New Zealand Statistics for 1879, 1880 and 1881.

made oats the basic crop in a similar regime in Southland. Oats had long been a feature of the economy of the small farmers but in the late 1870's became an increasingly important factor in the agricultural regime of the interior.

For many years, the tussock grassland had resisted the plough and served as a barrier to the expansion of settlement. The old English-style plough broke easily and was completely inadequate for the clearing of land from tussock.²¹ The invention of the double-furrow Pirie plough in Aberdeen, Scotland in 1870 gave the Southland farmer a tool which allowed him to cultivate the tussock.²² This innovation had a dual impact in the period 1878-1882. Small farmers

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21. A.H. Clark, The Invasion of New Zealand by People, Plants and Animals, (New Brunswick, 1949), p.310.
22. R.H. Scott, "Cereal Production," N.Z. Journal of Agriculture, Vol. 75 (May, 1947), p.355.

began to move out from the parkland fringe onto the tussock and the runholders began to consider the value of growing grain. In order to transform the natural pastures into sown grasses, it was necessary to cultivate and the cost of cultivation could be met by taking off several crops of oats. Intended as a stage in the conversion to a more intensive system of pastoral farming, the growing competitiveness of oats compared to wool forced many runholders to consider grain as more than a temporary crop but as an alternative to the declining wool industry.

Southland oats had three markets in the early 1880's. There was a considerable local market since the horses required for cultivation needed inputs of fuel in the form of oats. Oats were also a useful supplementary fodder crop for sheep and cattle, were necessary for the horses in the growing towns and lastly were a common food for the Scottish settlers. There was a considerable internal trade to the grain deficient areas of the North Island and a growing export trade to Australia, Britain and a variety of other countries.

Southland produced 16% of New Zealand's oats and 20% of local production was exported overseas and probably about 20% shipped to other parts of New Zealand. There is a lack of data on the internal trade in grain. The surplus areas were in the South Island and fragmentary data for a

six month period in 1879 shows that important flows existed from the grain areas of Canterbury, Otago and Southland to Auckland, Wellington, Wanganui and the West Coast.²³ More data exists on the export of oats from New Zealand and a few interesting trading patterns begin to emerge by 1880. The relative status of Southland as a producer of oats and the main overseas markets can be seen in the following table.

TABLE 3

Export of Oats from New Zealand²⁴
Destination and Origin 1879-1881

<u>Exporting Ports</u>		<u>Destination</u>	
Auckland	0.3%	United Kingdom	35.1%
Wellington	0.2%	New South Wales	11.1%
Lyttelton	34.8%	Victoria	25.2%
Timaru	5.4%	South Australia	15.5%
Oamaru	15.6%	Cape Colony	8.7%
Dunedin	23.0%	Mauritius	1.1%
Invercargill	20.2%	Guam	1.6%

23. "Export and Import of Timber, Flour, and Grain,"

A.J.H.R., (1879), H-25.

24. "Return showing the General Exports from the Colony",
New Zealand Statistics for 1879, 1880 and 1881.

The grain economy of Southland developed in the period of economic stress immediately prior to refrigeration and it was to expand until the collapse of the Boer war boom. In 1880, wool was a declining factor in the agriculture of Southland and arable farming was an element of growth. For a short while (approximately from 1876 to 1889), Southland had a wool and grain economy but the agricultural transformation that was brought about by the introduction of refrigeration was to convert it into a fat sheep and grain economy with wool being an important but subsidiary element in the structure of local farming.

2.4 Anticipation of Refrigeration - Changes in the Sheep Industry 1878-1882.

There were two divergent trends in Southland agriculture in the era immediately before the successful implementation of refrigeration in the New Zealand trade. The general depression beginning in the late 1870's had forced farming to consider two new lines of development; one directed towards an expansion of arable farming and the other towards a more intensive system of pastoral farming.

The rising prosperity of the British working class seemed to offer an outlet for mutton sales if only there was

the technological capability for New Zealand to supply the market. Live meat exports had long been a feature of the trans-Atlantic trade and in the 1870's, the export of frozen and chilled beef from the United States and Argentina commenced and reached significant levels by 1881 with the United States shipping 747,000 cwt. of chilled beef to Britain in that year.²⁵ There had also been a number of attempts to establish a frozen meat export trade in Australia and although they had been financially unsuccessful, there was no doubt that the basic idea was sound.

These overseas developments were observed and commented upon in New Zealand and many trends in the sheep industry in Southland arose more from a general anticipation of refrigeration than from the much heralded voyage of the S.S. Dunedin in 1882. The trends towards a more intensive system of pastoral farming began in 1878 and although this had a dual focus with a greater wool clip to offset falling prices being an equal incentive to the diversification of the industry into the production of mutton for export, the

25. J.T. Critchell and J. Raymond, "A History of the Frozen Meat Trade", (London, 1912) p.423.

importance of the latter cannot be neglected. The first export cargo of mutton left on the S.S. Dunedin in February, 1882. In many ways it was an experiment but in other respects, it represented the culmination of trends already evident. For instance, the Burnside Freezing works were already under construction in Dunedin and an export-oriented dairy factory had been established at Edendale.²⁶

Southland had experience with the export of tinned meat from the Winton and Woodlands plants of the N.Z. Meat Preserving Company in the 1870's. At first these plants suffered from the inadequacies of the canning process and the propensity of farmers to sell aged ewes culled from the flocks²⁷ but eventually the tinned meat trade established

26. D.F. Murdock, Freeze and Prosper: The Impact of Refrigeration on the Rural Development of the South Island 1880-1901, unpublished M.A. thesis, University of Otago, 1968. This work develops the theme of anticipation of refrigeration in detail.

27. J.A.H. Caird, op.cit., p.22.

the basis of interest in the export of meat. Reports in the press of overseas developments and local agitation for refrigeration culminated in a series of public meetings held in Invercargill in 1881 to discuss the implications of freezing. The idea of frozen meat exports loomed large in the public imagination as a means of salvation from the economic depression.

Developments in the sheep industry reflected this change in attitude. Wool was no longer the only aim of the sheep farmer, the production of mutton began to assume a greater importance. In the early 1870's, the impact of the runs on the natural landscape had been minimal. The only common form of pasture improvement had been the burning of the tussock to remove unwanted shrubs and to increase the palatability of the grass. In the period between 1878 and 1882, a number of trends were becoming apparent involving the switch from merino to crossbred sheep, from natural pasture to sown English grasses and the raising of supplementary fodder crops. The following statistical table (table 4) illustrates a few of the trends evident prior to refrigeration.

TABLE 4Sown Grasses and Fodder Crops 1878-83²⁸

	<u>Sown Grass</u> (acres)	<u>Turnips and Rape</u> (acres)
1878	98,300	37,700
1879	124,300	36,400
1880	141,600	40,800
1881	186,500	52,300
1882	217,300	61,300
1883	241,400	65,900

These changes were all interrelated as Southland began to move from a frontier system of extensive pastoralism into a system of intensive pastoralism based on the traditional British model. Crossbred sheep were able to provide a carcass suitable for freezing as well as a moderate wool

28. Source for table 4: "Agricultural Statistics - Summary by Counties," N.Z. Statistics for 1878-1883.

clip. Longwool sheep (Lincoln, Romney and Leicesters) were introduced first into the damp pastures of the Southland plains since they were not as susceptible to footrot as the merino. Various types of crossbred sheep were grazed on the medium country in the hope that a heavier wool clip (the merino would clip only about three or four pounds) would counterbalance the fall in prices. These sheep required English grasses and fodder crops in order to survive the winter and thrive during the summer.

Turnips were the main fodder crop in Southland. The labour input involved was small since the turnips could be fed off in the fields and there was no need to dig and store them. Originally sown broadcast, weed infestation later made the farmers switch to the English system of sowing in drills but even then, the costs of cultivation of an acre of turnips was estimated to be under eleven shillings per acre.²⁹

29. "Information Regarding the Freehold Lands in New Zealand Offered for Sale by the New Zealand and Australian Land Company Limited, (Edinburgh, 1882)
p.51.

Much of the improvement in Southland agriculture can be attributed to the activities of the two large companies that were active at the period. These companies had invested large sums of capital and technical expertise into improving their estates in order to make them more attractive to the small settler. The original plan of these companies was to fleece the settler and not the sheep. In the case of the New Zealand Agricultural Company on the Waimea plains this was very clear³⁰ but even the more enlightened management of the New Zealand and Australia Land Company was eager to rid itself of the Edendale Estate since it was a financial burden yielding only $1\frac{1}{2}\%$ on the investment.³¹ Falling land prices forced the company to cease sales to settlers and work their estates for a number of years as large scale pastoral runs and arable farms.

30. D.A. Hamer, "The Agricultural Company and New Zealand Politics," Historical Studies (Aust. and N.Z.), Vol. 10 (May, 1962) pp.141-164.

31. W.S. Davidson, A Sketch of His Life., (Edinburgh, 1930) p.98.

On the Edendale Estate, the large resources of the company allowed it to conduct a number of experiments. Some of these experiments were aimed at trying to increase the estates' profitability, the others at increasing the estates' attractiveness to small settlers. The use of polled Angus bulls to improve the quality of beef cattle, the sowing of English grasses and the crossing of longwool rams and merino ewes to get a beast better suited for lowland pastures aimed at the first objective; experiments in liming and the establishment of a dairy factory looked towards the second. Not all experiments were successful. The wet winters made the winter grass unsuitable for Merino and Leicester hoggets and on the "sour" lands of the plains, the laying down of 16,000 acres of sown grass was a failure as it reverted to tussock within a few years.³²

The basic patterns of Southland agriculture over the next twenty-five years were established in the period prior to refrigeration. The successful implementation of refrigeration as a means of transporting meat and dairy products from the Southern hemisphere to the markets of Britain did not cause the switch to more intensive pastoral farming.

32. General Managers Report, New Zealand and Australia Land Co. Ltd., (1879) p.12.

Rather, the depression and the anticipation of refrigeration had initiated the trends, the implementation of refrigeration just speeded up the pace of agricultural development along the already indicated path.

CHAPTER THREE

SOUTHLAND AND THE REFRIGERATION REVOLUTION 1882-1906

3.1 Introduction

In 1882, the New Zealand and Australia Land Company leased the S.S. "Dunedin" to carry a cargo of frozen mutton from Port Chalmers to Britain. The successful implementation of the transport of refrigerated perishable products from New Zealand to the new urban markets of northwestern Europe led to an intensification of the rate of agricultural change in Southland. These changes were in directions established during the period prior to refrigeration. Depression had made the Southland farmer consider the alternatives to extensive pastoralism; refrigeration gave him the means by which the existing trend towards more intensive farming could be made more profitable.

The general theory concerning the impact of refrigeration maintains that the development of the freezing process made small-scale intensive sheep and dairy farming possible in New Zealand. This thesis, with a number of modifications is basically sound. The Southland Times reviewing local progress in agriculture over the previous ten years, commented

in 1894 that "it is becoming more and more evident that the future of the New Zealand farmer is to be determined by the success of the frozen meat and dairy industry of the colony."¹ However, it would be erroneous to attribute too much to any single factor and a number of other elements must be considered in an analysis of the impact of refrigeration on the agricultural geography of Southland. Changes before 1882 illustrate that trends towards a more intensive system of land use were already in existence and although anticipation of technological developments was strong, the declining profitability of extensive pastoralism, the general economic depression, and the mixture of land hunger and radical politics all had an impact on the subsequent pattern of development.

The last decades of the nineteenth century and the early years of the twentieth century played an important role in the evolution of the land use system in New Zealand. The adjustment of Southland agriculture to the "refrigeration revolution" will be examined within a limited number of basic themes. The closer settlement of the land, the development of the frozen mutton trade and the rise of the dairy industry have all been regarded as the major consequences

1. Southland Times for Jan.6, 1894.

of this advance in transportation technology. It will also be necessary to consider the main rival to intensive pastoral farming. The grain trade did not decline and disappear. In fact it survived and even expanded during this period. In this examination of how Southland agriculture adapted to refrigeration, special emphasis will be placed on the definition of regional patterns. The processes of change and the spatial reaction to these processes must be considered in order to understand the impact of refrigeration.

3.2 The Expansion of Settlement

One of the major fields of interest in historical geography has been a concern with the delimitation of the frontier of settlement at different periods. Owing to the nature of settlement in Southland during the period under review, many of the common methods of analysis are not feasible. It is not possible to draw a single line on the map and state that this was the limit between the settled and unsettled at any particular date. However, it is possible to define the limits of effective settlement at different periods and show how an initial influx of settlement, fairly thin on the ground, was followed by a process of the infilling of the empty areas by later arrivals.



Plate 1 The Invention of Freezing.

Seven original members of the staff of the
Ocean Beach Freezing Works in the 1890's.

In the past, too much attention has been given to the frontier margin and too little to the areas behind the frontier which were being intensively settled. The present study will briefly examine the settlement process and make a number of tentative conclusions concerning the relationship of settlement to agricultural progress and change.

Analysis of patterns of settlement is strongly influenced by the criteria used to measure them. Three criteria are commonly used: the margin of freehold land, the limit of effective settlement and the limit of close settlement. The first is inadequate since in Southland in 1878, large companies controlled vast areas of freehold land on the interior plains but these areas could not be considered settled.² The second criteria established a limit of effective settlement as a population density of two persons per square mile. In conjunction with the third criteria that measures areas of close and compact settlement with a

2. The margin of freehold settlement at this date is shown on a "Map of the Middle Island, New Zealand, showing the Land Tenure June 30th, 1879" held in the Alexander Turnbull Library, Wellington.

population density of at least ten persons per square mile, the two maps provide a means in which the broad general patterns of settlement can be discovered.³

In 1878, the area of close settlement (figure 6) was limited to the parkland zone in the southernmost parts of the Southland plains. Early settlement was attracted to the parklands for a variety of reasons. The grasslands were regarded as infertile and in any case, the limited agricultural technology of the period prevented the ploughing of the tussock until the mid-1870's. Farms in a bush fringe location with easy access to wood for fuel, fencing and housing, and with the availability of railway transport to Invercargill, were the most desirable lands in 1878. As shown in figure 5, there was a fairly large population scattered around the plains but the forested area running in a broad band along the coast was practically empty. Only in the Orepuki-Round Hill district south of the Longwood Hills with its large population of gold miners did the early settlers attempt to tackle the forest zone.

3. The maps showing the margins of settlement at different dates were constructed from the Census returns of population by locality within each county riding.

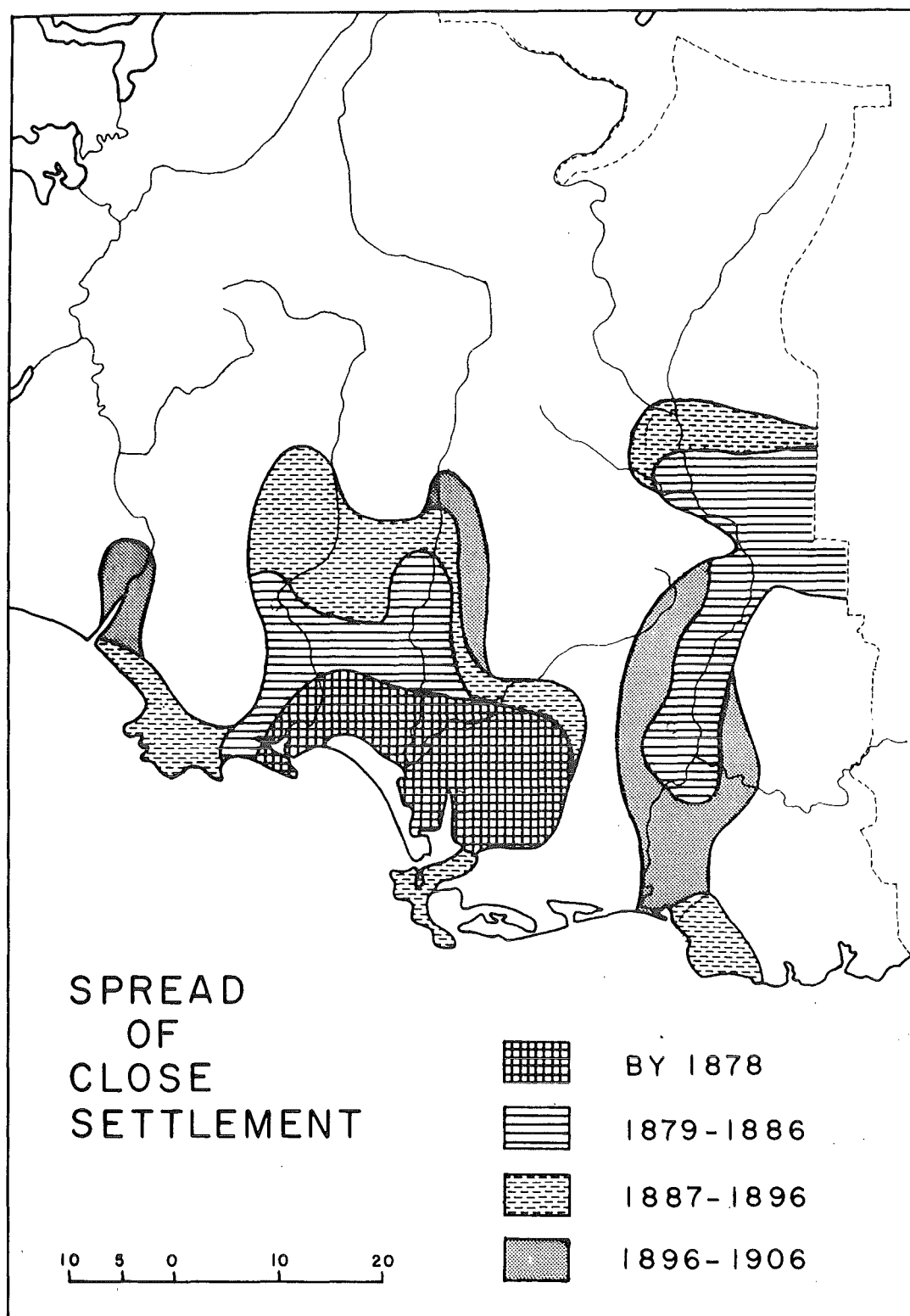


Figure 5

Within eight years, the area of close settlement had extended itself into the second tier of hundreds. Population thrusts were made up the Aparima valley towards Otautau and up the Oreti valley towards Winton. A second core area, isolated from the first appeared in the Mataura valley with compact settlement running north from Edendale through Gore and into the Otama, Chatton and Waikaka districts. The frontier margin had also expanded as small settlers began to move into the forested areas south of the Longwoods and into the Toitois district of the Catlin ranges.

The period 1878-1886 was the critical era in the settlement of Southland. A number of technical developments in grain farming and the intensification in the sheep industry made possible by refrigeration encouraged small farmers to settle on the tussock grasslands. The patterns and problems involved in this process of the invasion of the tussock warrant greater study but only a few of the general trends can be discussed at this stage.

These were the years of massive in-migration to Southland (table 5). Although there is limited data on migration in this period, it can be postulated that the Southland region was serving a function similar to that of the North Island bush areas by absorbing settlers from the excess rural population of the older settled farming districts

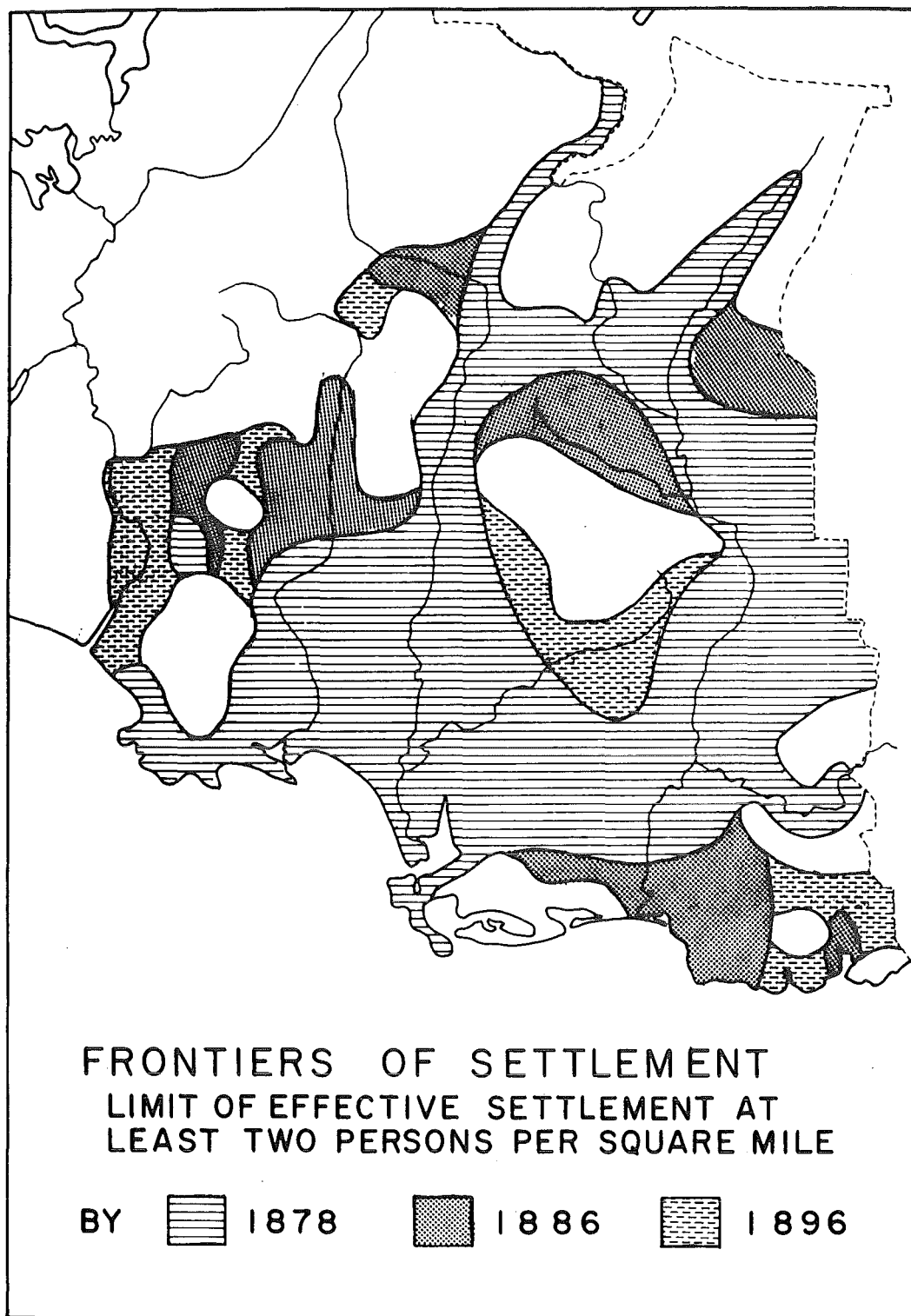


Figure 6

of Otago and Canterbury. The first wave of in-migration to Southland (1878-1886) included a fairly strong British-born contingent but the available evidence suggests that this was not direct migration from overseas but merely a part of the general reshuffling of population within New Zealand.

TABLE 5

Net Migration 1878-1906⁴

<u>Period</u>	<u>Southland County</u>	<u>Wallace County</u>
1878-81	+2150	+1080
1881-86	+3360	+1290
1886-91	-540	-730
1891-96	+330	+980
1896-01	-1030	+1520
1901-06	+340	-2060

-
4. Migration rates were calculated from Census data using the vital statistics model and local figures for birth-rates and death-rates.

Following the initial period of extensive in-migration of rural settlers, the period 1886-1891 was characterized by a net outflow of people from both Southland and Wallace counties. After this date, Southland remained fairly stable while large numbers of settlers were attracted to the Wallace county as population began to advance further into the forest zone between Riverton and Tuatapere, and further north on the tussock grasslands into the Wairio and South Hillend districts (figure 6).

The impact of the large land companies on the settlement of Southland must also be carefully considered. The New Zealand Agricultural Company controlled the Waimea plains and whether its activities tended to advance or retard settlement is a matter of dispute. Land companies in Southland had a generally good public image and the population of the Waimea plains increased fairly rapidly before 1886 as the Company actively sought to promote settlement. But, a comparison of the population densities of the company estates west of the Mataura and similar land east of the river (figure 6) tends to suggest that this company perhaps was a disincentive to rapid settlement.

A similar situation is seen when considering the settlement of the Edendale estate of the New Zealand and Australia Land Company. By 1886, settlement east of the

Mataura river outside the estate boundaries was fairly dense, and the contrast in population density between these regions is interesting since it tends to suggest that comp- any rule, no matter how liberal the terms offered to small settlers, tended to delay rather than promote the settle- ment of many areas. The companies would only sell land when prices were high and because of the general low level of land prices in the late nineteenth century, held on to large areas in the hope that it would eventually increase in value.

J.S. Duncan (1962) has called for a closer examination of land policy in Southland since the area seemed to "offer scope for drastic 'busting-up' operations" but it also seemed "to have escaped rather lightly."⁵ Closer settlement of the land was strongly promoted by the New Zealand Government. The Atkinson ministry had surveyed the Catlins for small sheep farms, the village settlement scheme was begun in the

5. J.S. Duncan, "Land for the People: Land Settlement and Rural Population Movements 1886-1906" in Murray McCaskill, ed., Land and Livelihood, (Christchurch, 1962) p.189.

1880's and the activities of the McKenzie land policy in promoting the spread of closer settlement are well known. Less well known are the effects of the Agricultural Deferred Payment scheme which settled many small farmers on the land in the 1880's and was probably the most important form of tenure in advancing settlement into the bush and out onto the tussock.⁶

In many cases, the land was being broken up voluntarily by runholders since extensive sheep farming was an unprofitable venture. The Royal Commission on Land Tenure (1905) shows that there was relatively little discontent about the rate of break up of the estates at this period. There were ample means to persuade any reluctant owner of a large estate to sell but the Government had no trouble in acquiring numerous blocks of land throughout the district on which to promote various types of special settlement projects. Thus, a large proportion of the new settlement after 1895 took

6. The important role of the Agricultural Deferred Payment system may be studied in detail from data held in the National Archives (Lands and Survey Archives, Series 21) which records the block selected, the rent and the fate of every settler under the scheme.

place in scattered regions rather than in a broad zone of settlement.

Many of these Government settlements were in the forested areas where the bush - burn economy of the North Island was being duplicated in Southland. While the bulk of settlement occurred prior to 1886 and before the impact of refrigeration was of much practical significance to the small farmer; settlement in the late 1890's and in the early years of this century was mainly oriented towards a type of pioneer dairy economy located in the fringe areas around the Southland plains.

3.3. Southland and the Development of the Frozen Meat Trade 1882-1906

The development of the frozen mutton trade in the quarter century following the successful implementation of refrigerated transport was characterized by a number of distinct stages. Firstly, there was an initial reaction (1878-1885) which straddled the period during which refrigeration was being introduced into Southland. Involving the greater use of crossbred sheep, the growing of supplementary fodder crops and the laying down of English grasses, it did

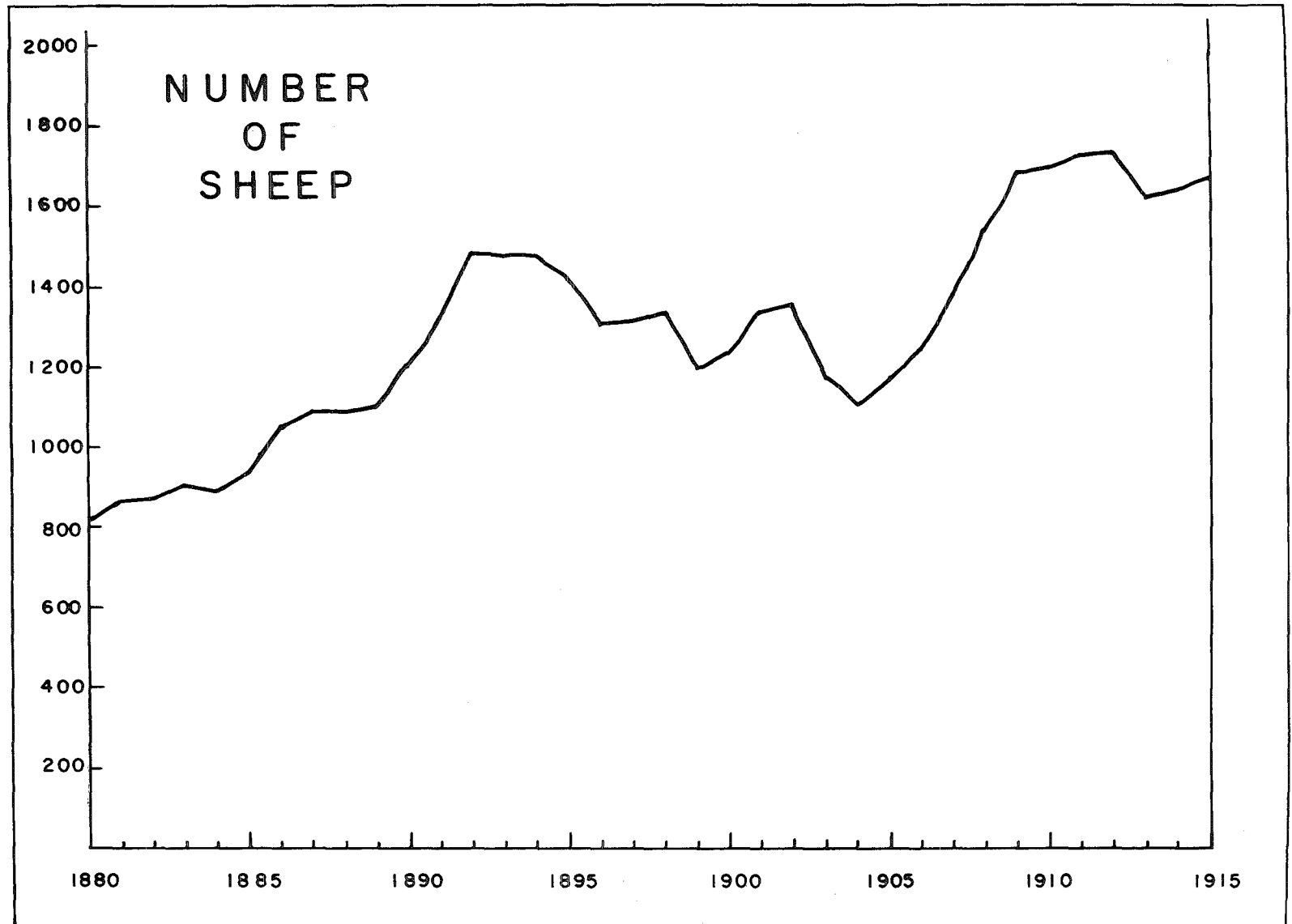


Figure 7

not have much effect on the total number of sheep in the province. The second period (1886-1895) represented a culmination of the changes introduced during the first. Sheep numbers began to increase in 1885 and after a short pause rose rapidly between 1889 and 1892 when they levelled off at about 1,450,000 sheep. This sudden spurt in sheep numbers represented the climax of the frozen meat trade in this period. After 1895, sheep numbers began to fluctuate erratically until 1905 when a new type of pastoralism known as "high farming" began to have important effects in Southland and moved the province from one basic stage to another in its evolution towards an intensive grassland economy.

In 1884, the first direct shipment of frozen meat from Southland was made with the S.S. "Opawa" sailing for London with a cargo of 6,550 carcasses of mutton. The next year saw a freezing works established at Bluff to tap the movement of 40,000 sheep which were being sent to the Burnside works in Dunedin, a clear indication of the early interest in refrigeration. The reaction to refrigeration occurred at two scales. The large runholders were expanding their flocks to take advantage of the new market for mutton though the production of wool was still the predominant aim. Many small farmers were also beginning to enter commercial sheep farming,

usually as a sideline to grain production. The reaction of the various segments of the farming community to the frozen mutton trade can be shown by a table giving the structure of sheep ownership by size of flock over a twenty year period.

TABLE 6

Percentage of Sheep by Flock Size 1880-1900⁷

	<u>Large Flock</u> (over 5,000)	<u>Medium Flock</u> (1,000 to 4,999)	<u>Small Flock</u> (less than 1,000)
1880	80.6	10.6	8.8
1885	67.9	17.6	14.5
1890	64.7	15.1	20.2
1895	51.2	20.3	28.5
1900	35.8	25.3	38.9

-
7. Calculated from the Annual Sheep Returns in the A.J.H.R. for 1882 (1880), 1885, 1895 and 1900 and in the New Zealand Gazette for 1890.

The large owners dominated the mutton trade in the early years. The Edendale Estate in 1890 fattened 10,000 crossbred sheep and 4,000 cattle and the efforts of the small farmer were puny compared to this large scale operation.⁸ Small farmers faced a number of handicaps. It was debatable if sheep could pay on a small acreage especially as most small farmers did not have the capital to lay down grass and purchase stock. Furthermore, the farmer had to arrange marketing, insurance and transport for his meat to London. Most small farmers lacked experience in the handling of sheep, the opinion of the Sheep Branch being that many of the agricultural settlers on the plains showed "considerable ignorance in the treatment of sheep"⁹ and grain continued to be their main focus of production. Eventually the small farmer began to take an interest in refrigeration. Seven

8. Robert Wallace, The Rural Economy and Agriculture of Australia and New Zealand, (London, 1891) p.271.

9. R.H. Johnson on January 25th, 1881 in Outward Letterbook, Sheep Branch Dunedin held in National Archives.

of the eight farmers on the first Board of the Southland Frozen Meat Company owned less than a thousand sheep¹⁰ but it was not until the 1890's that they began to rival the large runs.

This impression of the dominance of the large run-holders is reinforced by a consideration of the patterns of increase in sheep numbers in the decade 1880-1890 (figure 8). The areal intensification of pastoral farming was general with a doubling of carrying capacity over most regions. In the Mararoa-Waiau Valleys and the Five Rivers plains, increases in stock occurred on natural tussock grasslands and were due to the expansion of the large runs as were similar large increases noted in the Otarara Downs south-east of Gore. The only area where the small farmer played a significant role in the expansion of sheep farming was in the arable districts of western Southland where many farmers were shifting into sheep production from grains.

In the period 1890-1895, the role of the small farmer began to increase with an expansion of sheep numbers on the

10. D.F. Murdock, Freeze and Prosper, unpublished M.A. thesis, (University of Otago, 1968) p.63.

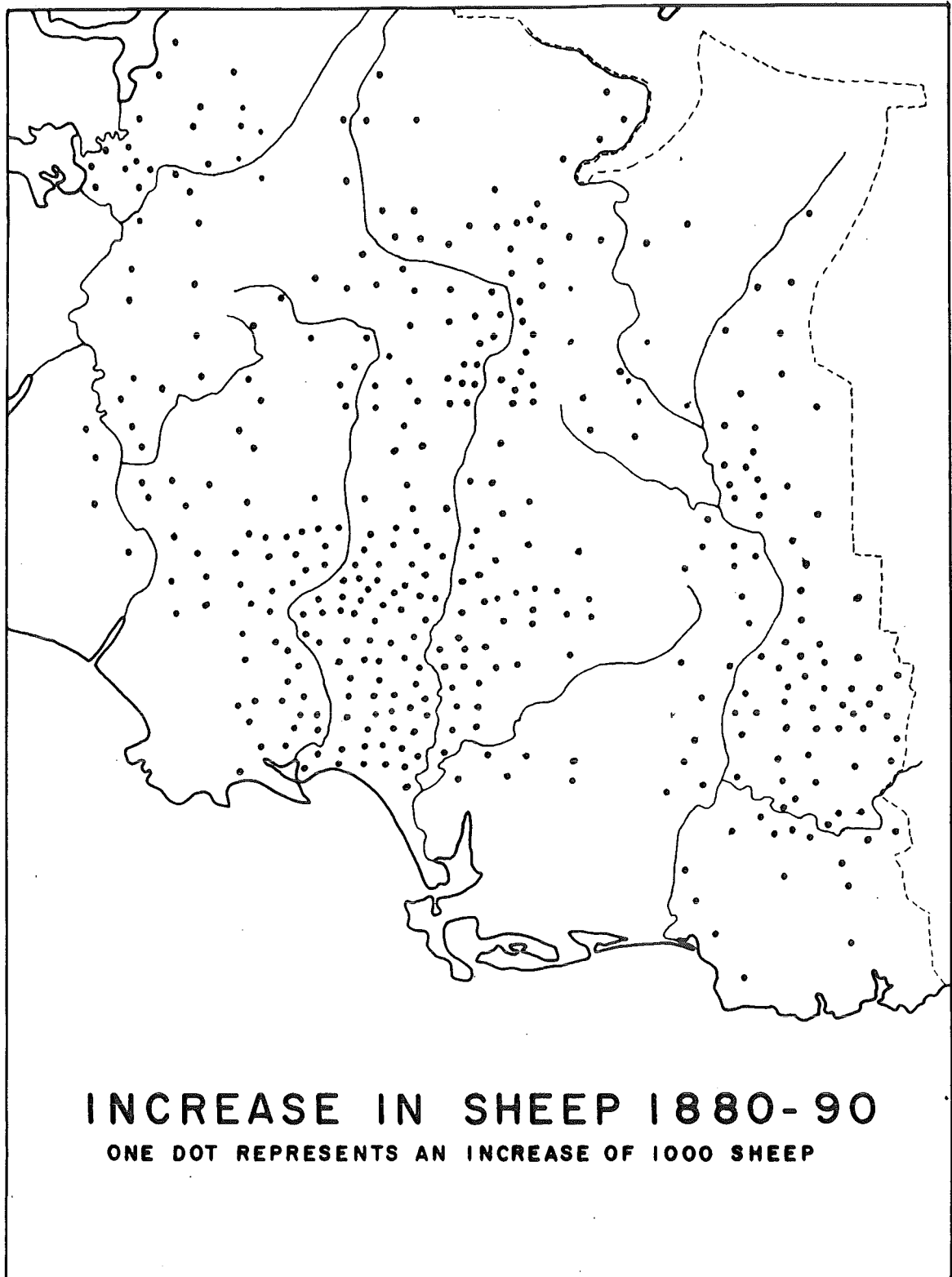


Figure 8

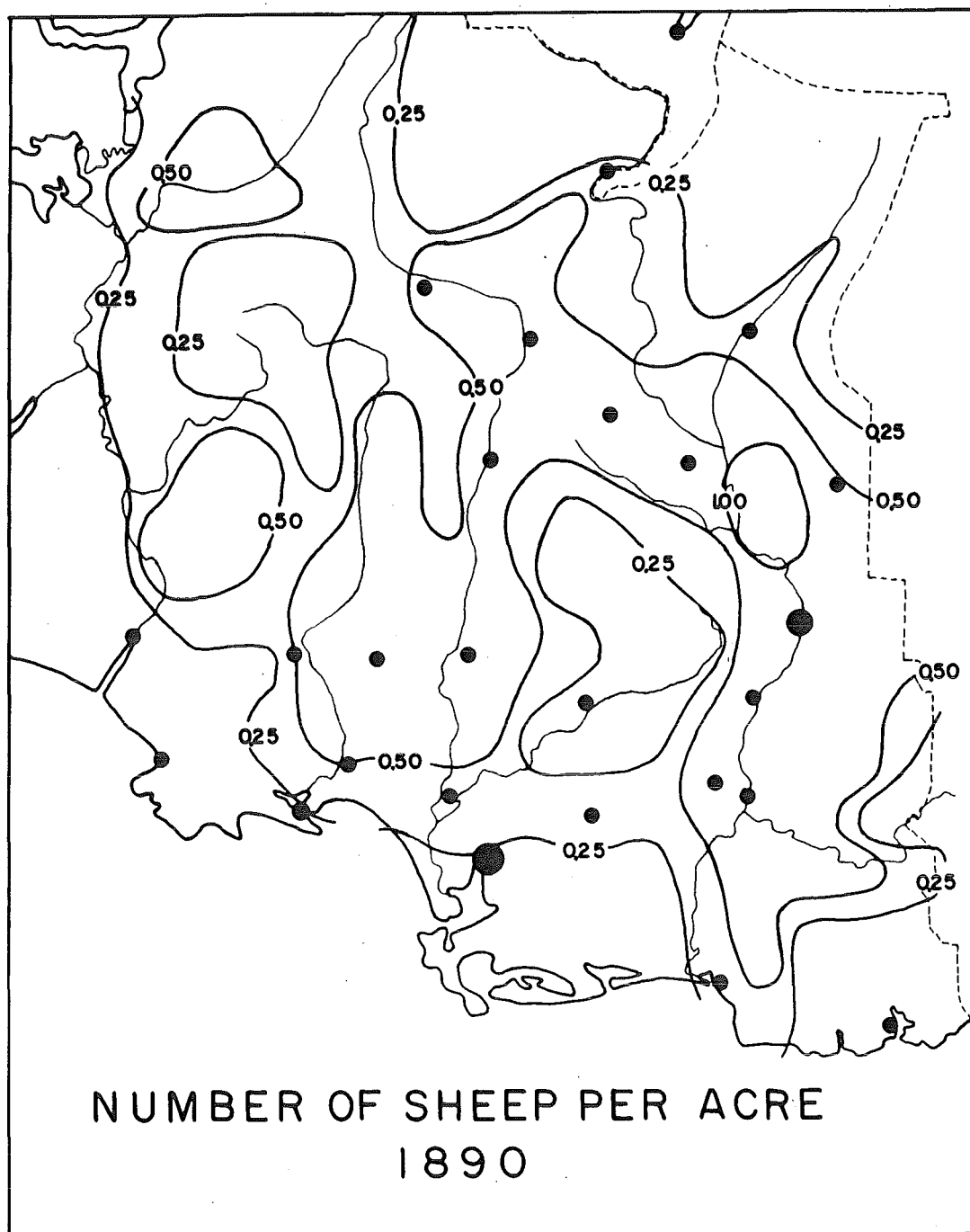


Figure 9

lowlands and a contraction of sheep numbers in the natural tussock grasslands of the northern interior (figure 10). The year 1895 represents a high water mark in the early development of intensive pastoralism in Southland. Two new freezing works had been established to handle the increasing number of sheep and a price war between Joseph Ward's Ocean Beach plant and the Southland Frozen Meat Company served to stimulate interest in sheep by offering high prices to the farmer. A consideration of the number of sheep per acre (figure 11) reveals that intensive mutton production (with at least one sheep to the acre) was carried on in three separate core areas with less intensive mutton production over most of the intervening areas. These three core regions are important because they represent long lasting patterns in the agricultural geography of Southland. The "Drummond" core in Wallace county and the "Otama-Chatton" core in northern Southland through to at least 1940 continued to be the areas of most intensive production of sheep in the province. Perhaps the early emphasis on sheep with the accumulation of related skills preserved these core areas through a time when other regions were experimenting with a variety of different agricultural systems.

The final period (1895-1905), saw a surprising and unexpected phenomenon. The number of sheep in Southland

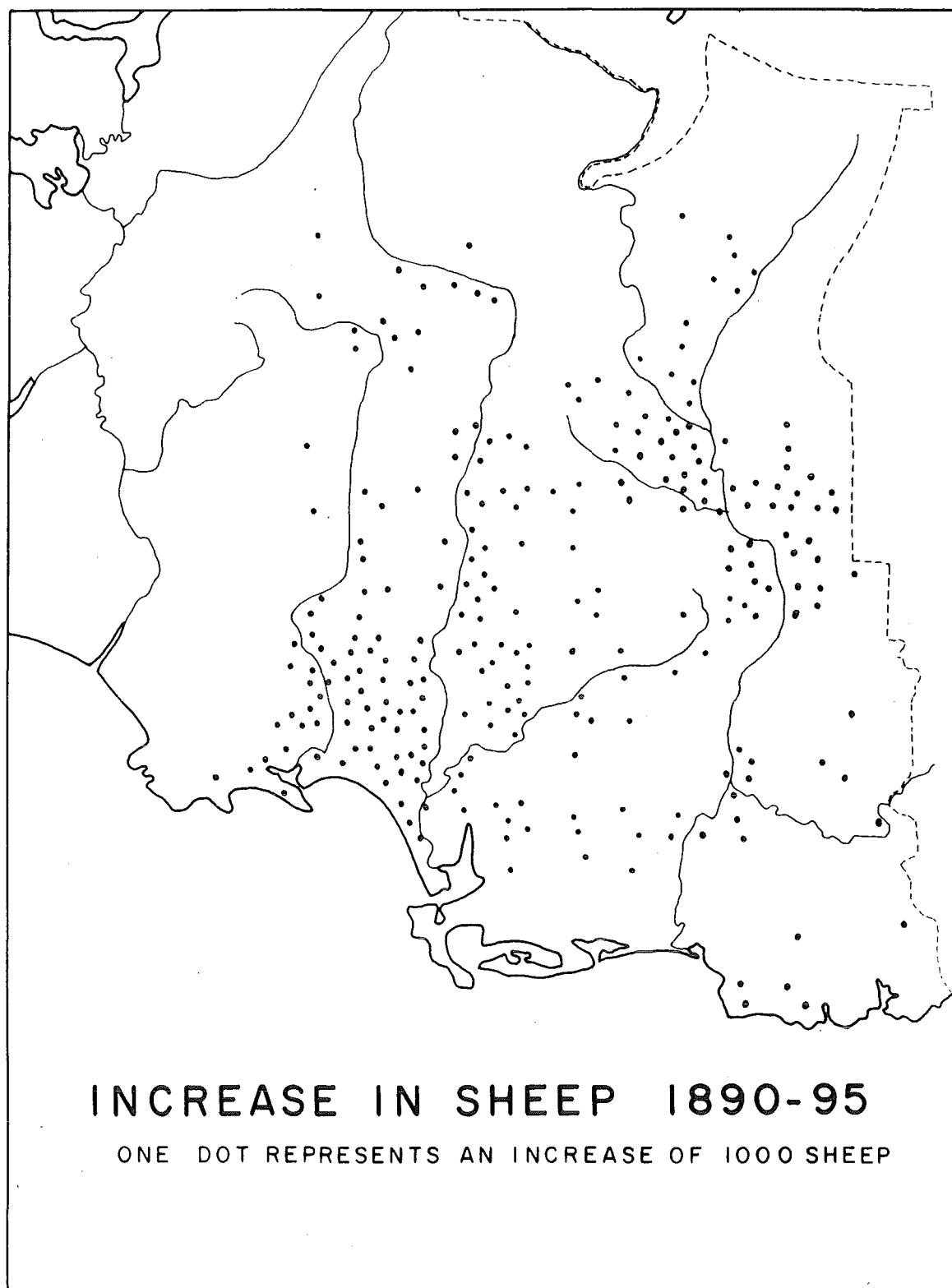


Figure 10

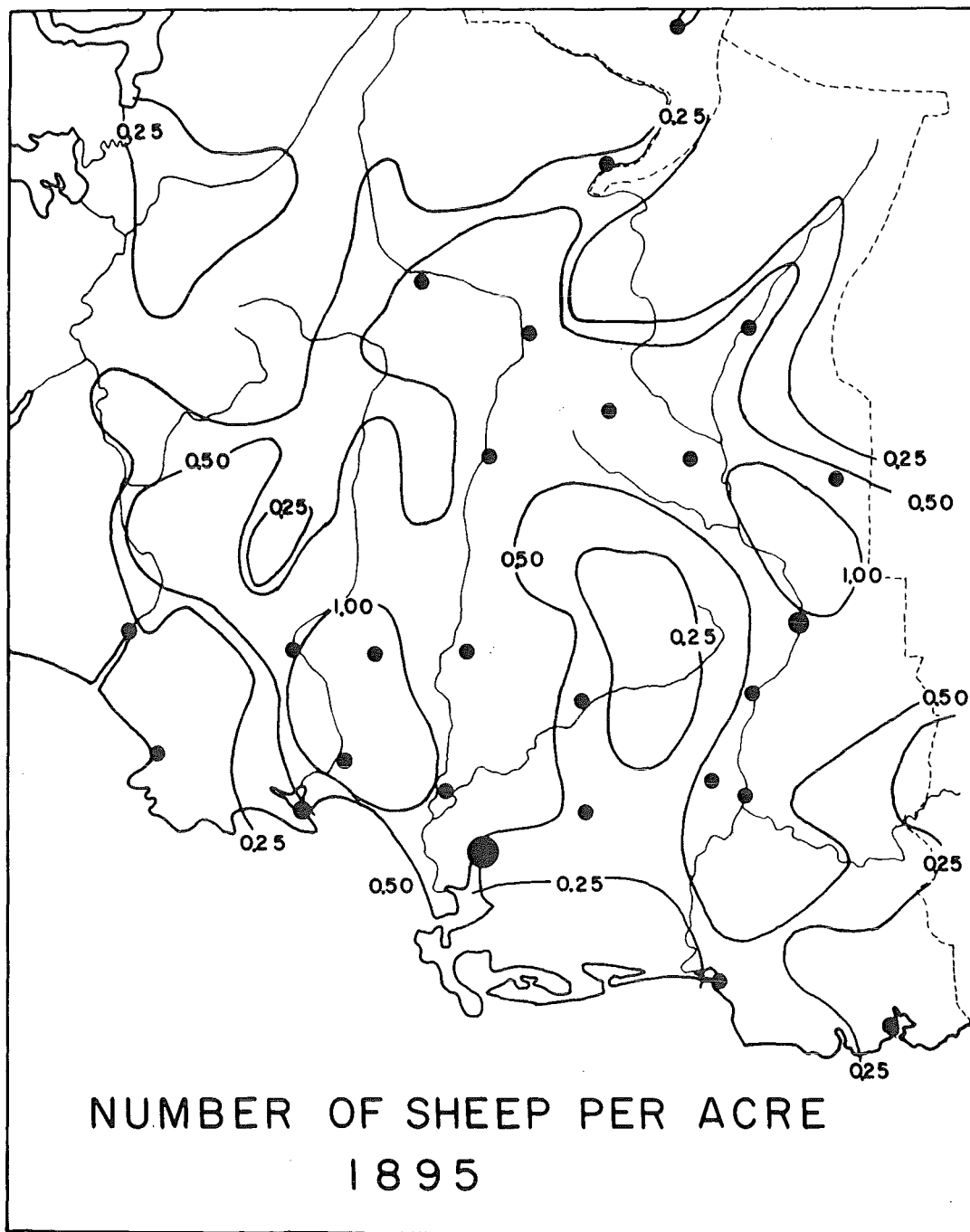


Figure 11

declined by nearly 300,000 over this ten year period. What exactly occurred can only be surmised and further analysis might upset the tentative reasons advanced for this startling drop in sheep numbers.

Declines in the sheep population were recorded over most areas irrespective of topography (figure 12). This decline can be partially attributed to the disintegration of many of the large runs such as the Edendale Estate which had formerly included large areas of lowland pasture. The small settlers on these lands took the land out of sheep production and devoted it to dairying and cropping. The dairy industry was beginning to consolidate itself in several areas of the plains, notably along the seaward fringe of the Wallace county where the dairy factories at Fairfax, Gummies Bush, Thornbury and Waianiwa attracted farmers from sheep into dairying. Eventually a core region for dairy farming was established as a rival to the 'Drummond' sheep district just to the north. More important than dairy farming was the increasing profitability of grain during the boom associated with the Boer War. Many areas that were experiencing declines in sheep numbers were switching into grains. The fall in the price received for frozen mutton (from 5 $\frac{1}{4}$ d. per pound in 1885 to 3 $\frac{7}{8}$ d. per pound in 1895) was

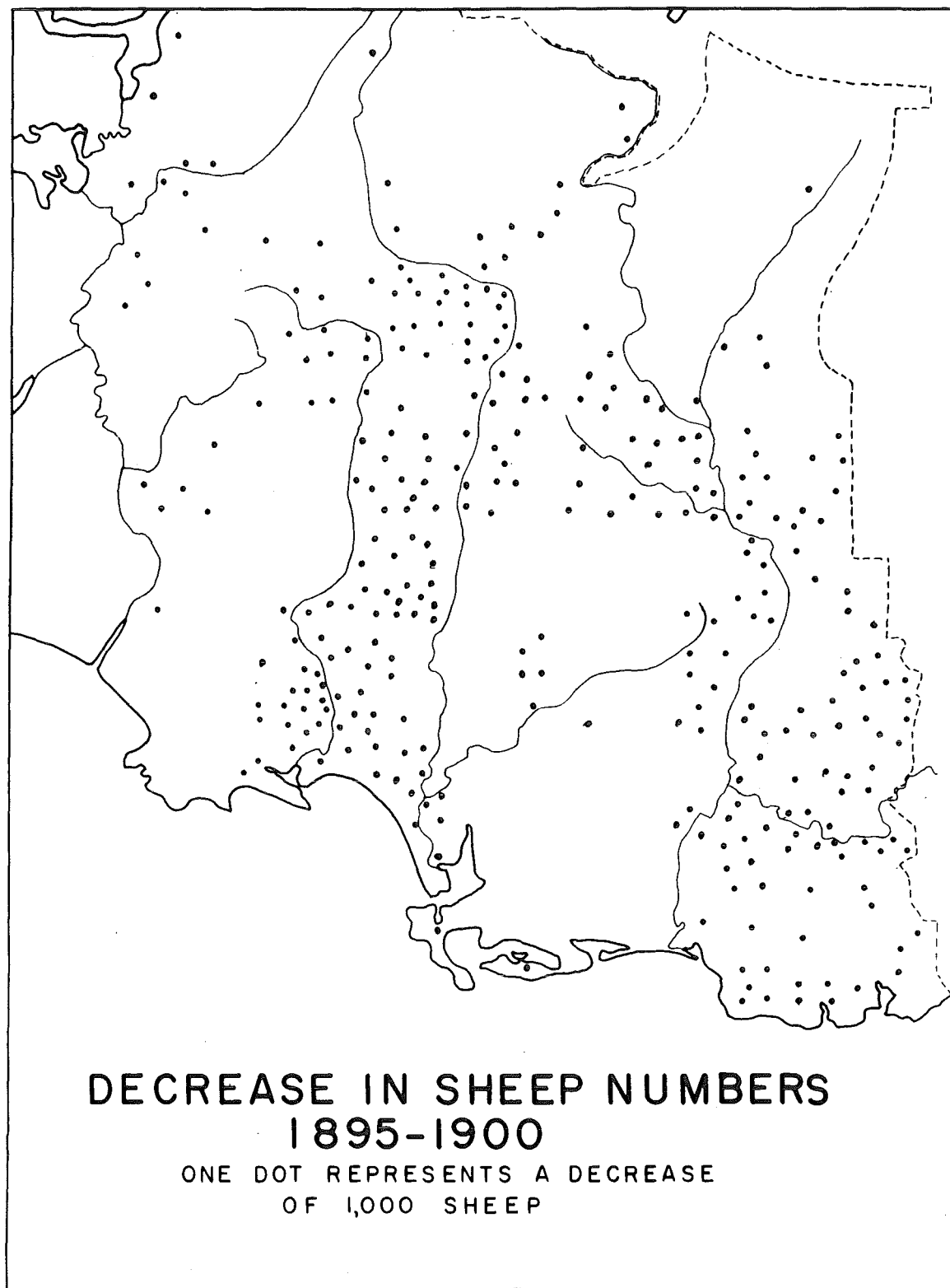


Figure 12

not adequately matched by falls in the cost of transport and freezing. Ocean transport rates had been reduced by 100% but internal transport costs were maintained. This was a special problem to the farmers of the interior who found it expensive to ship their stock to the freezing works near the Bluff. It was even more expensive to patronize the local freezing works at Maitara since the freight rate on frozen meat from Maitara to the sea were even higher than for live sheep.¹¹

The breakup of the runs reduced the large flocks, and even if the small farmer was interested in sheep raising, he did not have the resources nor the flexibility of a large run and so could raise fewer sheep on the same territory. Furthermore, increasing competition in the frozen mutton trade was coming from Argentina and the Cape Colony and the return to the farmer was declining. In order to meet this competition, New Zealand was switching from frozen mutton to an emphasis on fat lamb. The lowland areas, most suitable for fat lamb production were also the regions where competition from butterfat and grain was most intense. Consequent-

11. Evidence of Thomas Thompson, "Report on the Petition of the Canterbury Agricultural and Pastoral Association," A.J.H.R., (1896) 19, p.40.

ly during the period 1895-1905, Southland's emphasis on the production of sheep for wool and frozen meat began to decline.

By 1905, the embryonic regions of intensive sheep specialization that had appeared on the map of sheep densities in 1895 had disappeared with the exception of the Drummond region in western Southland where sheep densities continued to be greater than one to the acre (figure 13). However, the evolution of the three distinct sheep farming regions as outlined by Clark (1949) had continued.¹² Prior to refrigeration the production of sheep had been based on extensive pastoralism using natural pastures. Now there were three types of sheep farm. First, there were the "high country" wool farms in the upland zones using mainly tussock grasses. Carrying capacity had declined seriously as revealed in the evidence laid before a Royal Commission in 1905. A member of the Land Board commented that the tussock grassland was "very much better in its original condition than it is now; one acre was then equal to 10 now."¹³ Judging from comments on farming practices, this

12. A.H. Clark, The Invasion of New Zealand by People, Plants and Animals, (New Brunswick, 1949) p.217.

13. Evidence of John McIntyre, "Report of the Royal Commission on Land Tenure, Land Settlement and Other Matters," A.J.H.R. (1905), C-4, p.29.

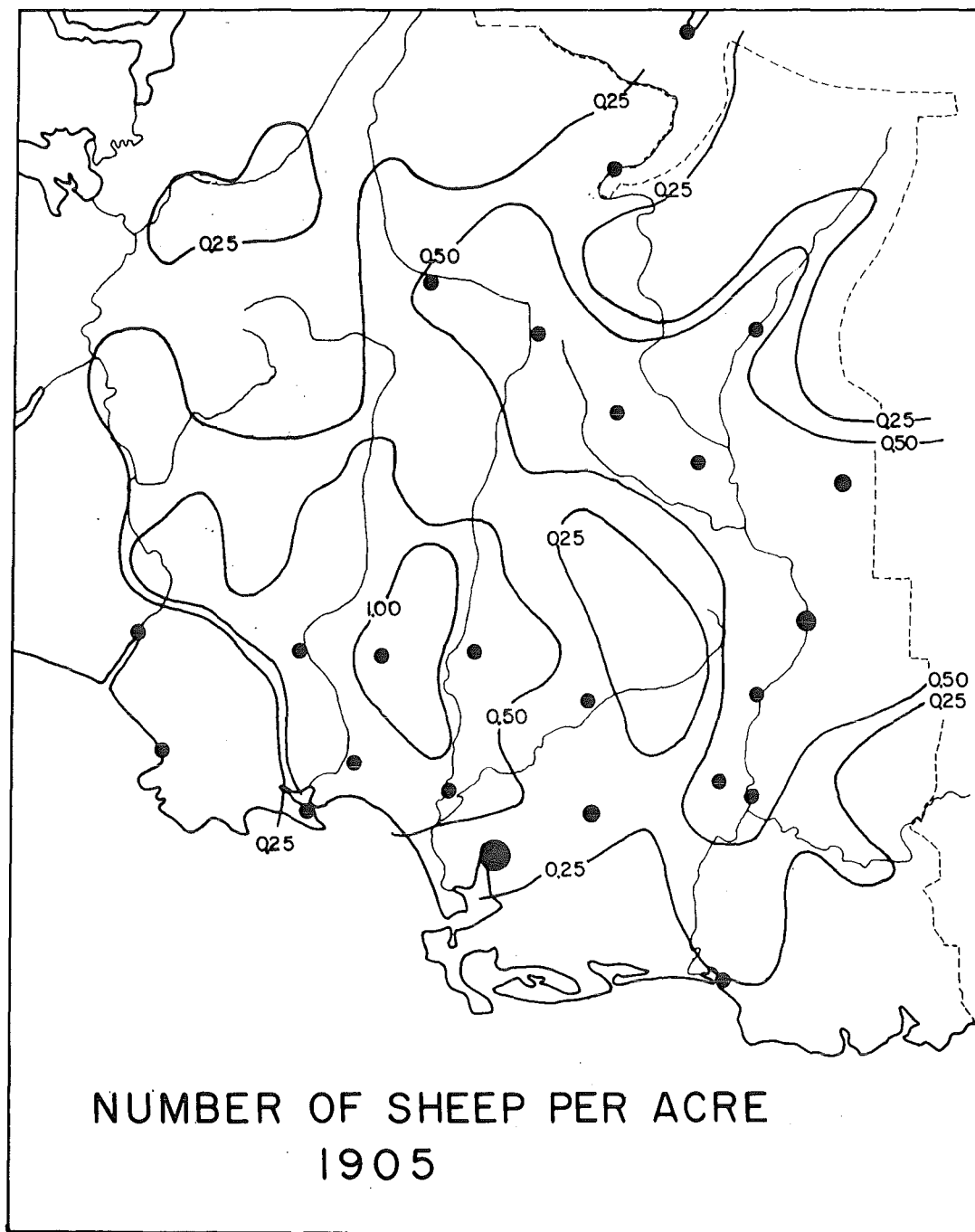


Figure 13

deterioration was unlikely to be checked. In addition to the wool farm, two new types of sheep farm had emerged. Store sheep were bred on the hills circling the plains and in the autumn the ewes were culled and sold to lowland farmers. The lowland farmers were moving towards the establishment of a fat lamb economy. By 1900, more lambs than sheep were processed at the freezing works and although the sheep industry was in a phase of regional recession in 1905, the elements that would lead to its revitalization were present.

3.4 The Dairy Industry - The Pioneer Phase

Southland was once the major cheese producing region in New Zealand. It has since been surpassed by many North Island districts but the eclipse of the dairy industry does not eliminate the need to consider the role it played in the establishment of the agricultural system of Southland. The period under review covers the early development of the dairy industry. Special consideration will be given to analysis of the role played by dairying as an agency of land settlement and of the regional pattern of production as the industry was on the verge of the breakthrough which established

its regional primacy over large areas of the Southland plains in the 1920's and 1930's.

Prior to the 1880's, farm cheese production in Southland was for the local market and the Otago goldfields, though small amounts were shipped to Australia. In 1881, the New Zealand and Australia Land Company under the impetus of its General Manager, Thomas Brydone, established a cheese factory on the Edendale Estate. At the time, the company was conducting large scale sheep and cattle operations but wanted to make commercial dairying a popular occupation in order to enhance the value of the land and promote settlement.

The construction of a cheese factory provided a market for the produce of settlers it was to attract to the district. The factory was supported for several years by milk from a company herd of three hundred cows but it soon attracted settlement into the previously neglected Mataura valley and established this region as a core area for the dispersal of the factory system and intensive dairying into adjacent areas of Southland.

The cheese factory system was an application of an American technological advance to New Zealand conditions. Originating in New York State in the 1850's, the factory system had spread rapidly throughout the northern United

States and southern Canada in the 1860's as farmers realized the benefits of large scale production of cheese. The exploitation of new markets along the American seaboard and in Britain hastened the transformation of many pioneering farming areas into commercial dairying districts.

The opportunities suggested by this mode of production were soon apparent in New Zealand. During the 1870's, two small cheese factories had been constructed but it was the concurrent introduction of refrigeration and the large scale of the enterprise that made the Edendale factory a success. The Edendale factory represented an investment of £1200 which clearly shows the value of company initiative. The Manager of the Edendale Estate, W.S. Davidson, visited Denmark and Canada to study the dairy industry and the Edendale factory, widely imitated throughout New Zealand, is a replica of one at Ingersoll, Ontario in the heart of the Canadian cheese district.¹⁴

New Zealand cheese could compete in the British market because of its lower cost of production and a season-

14. W.S. Davidson, "A Sketch of His Life...", (Edinburgh, 1930), p.31.

al advantage. Cattle did not have to be stall fed in winter and the milking season was much longer. New Zealand cheese also arrived in Britain as northern hemisphere stocks were being depleted. These advantages, plus the financial resources of the company, allowed the Edendale factory to survive its first few lean years. Once it became firmly established, it served as a model for the subsequent development of the cheese industry in Southland.

By 1890, eleven factories were operating in Southland in three distinct areas; one along the Mataura valley, another in the Woodlands district, and a third in the region settled by small farmers along the Invercargill-Riverton railway. On account of the perishability of the milk and the necessity for daily delivery, only farms within five or six miles of a factory, and more usually only two or three, could send milk to be processed into cheese. This difficulty in transport led to a dispersal of cheese factories through a dual method of expansion into new regions and the intensification of the factory network in the old districts. The location of cheese factories at different periods (figure 14) provides only a rough guide to the intensity of dairying in a region but in the absence of other statistics,

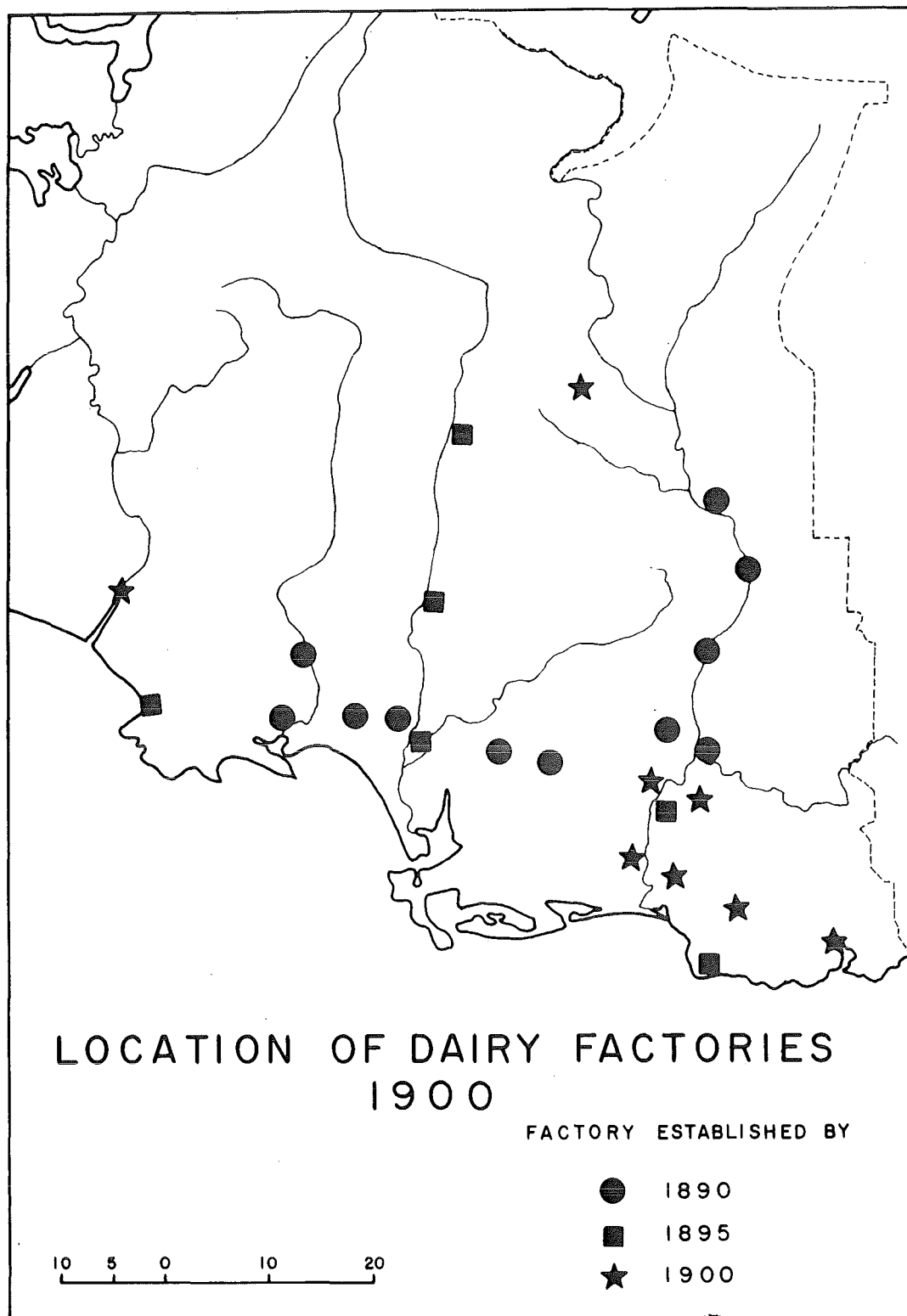


Figure 14

it has been used to trace the expansion of dairying during the pioneer phase.¹⁵

By 1900, in spite of the low price for cheese, fourteen additional factories had opened extending the areas of dairying activity along the eastern bank of the Mataura river and along the coastal flank of the Catlins so that the Southland dairying districts linked up with the dairying regions of South Otago. An isolated area of cheese production developed in the lower Waiau valley and south of the Longwood hills with factories established at Te Tua and Orepuki.

Considering the patterns of expansion of the dairy industry of the period, it is within the realm of possibility that expansion was oriented towards the rough pioneer areas fringing the lowlands where a hostile environment, rough terrain and dense forests inhibited other forms of agricultural activity. The first factories had been located on the

15. Data on the location of dairy factories was obtained from Stones' Otago and Southland Directory at five year intervals.

plains, either in the "tussock dairylands" north of Edendale or in the densely settled parkland zone. The expansion noted by 1895 was into the same type of region, but the factories established in the five years between 1895 and 1900 were increasingly oriented towards fringe locations especially in the Oteramika and Toetoes districts. Dairying seemed to play a major role in the closer settlement of much of Southland since it was a type of farming suitable for the small farmer with limited capital and occupying rough and undeveloped land.

During the 1890's, there was considerable enthusiasm for the small dairy farm as an agency of land settlement similar to that operating in the North Island at the same period. It had been estimated that in America using a factory system, a cow returned a profit of £8 to £10 per year and that a small farmer using family labour could handle a herd of thirty to fifty cows.¹⁶ This is not to say that it was going to be easy work. A description of the life of a dairy farmer in the Toetoes district illustrates the hard work demanded from a dairy farmers. "Up at daybreak", he said "assemble the cows and milk eleven of them, load the

16. Thomas Brydone, "Notes on Dairy Farming for New Zealand" paper read before the Otago Agricultural and Pastoral Association, Dunedin, 1881, p.8.

cans into the wheeled cart, drive to the factory, empty the cans and refill them with whey; back to the farm and empty the whey into troughs for the yelling pigs and then breakfast. Next out to the paddocks where I had to weed and hoe potatoes and turnips until afternoon when I had another meeting with my precious eleven cows."¹⁷

The small dairy farmer in the pioneer zone led a rigorous and unattractive life but in many cases there was no alternative. For cattle could open up country unsuitable for sheep or cultivation and dairying could support a growing rural population on a minimum amount of land. It was impossible for a farmer to "carry on successful sheep raising and maintain a family unless his land is capable of carrying five hundred breeding ewes."¹⁸ This would involve

17. Quoted in James Robson, Bits and Pieces,
(Christchurch, 1967), p.40.

18. Evidence of George Barwell, "Report of the Royal Commission on Land Tenure, Land Settlement and Other Matters", A.J.H.R. (1905) C-4, p.74.

nearly three sheep per acre on the average sized farm. Such a density was improbable on even the best lands of the plains and impossible on a partially cleared bush lot. The case with grain was similar. Most of the settlement blocks in the 1890's were too far from a railway to allow the economical transport of grain to a station and fertilizers to the farm, and many settlements were in areas climatically marginal for the growth of grain.

By 1905, the pioneering stage in the development of the Southland dairy industry was drawing to a close and dairy farming was on the verge of a breakthrough into a more intensive form of land utilization. Production was concentrated in three main areas; the lower Waiau valley, the Aparima-Waimatuku core and the Edendale-Gore axis. None of these regions could really be described as dairy intensive but the latter two represent the original core areas for the dispersal of dairy farming and continued to develop into the central foci for dairying in Southland. The early developments in the dairy industry left additional legacies. The large number of inferior cattle, the large number of small factories and the emphasis on cheese rather than butter can all be attributed to the early development of dairy farming in Southland and its development into a pioneer-fringe type of economy.



Plate 2 The Clearing of the Land

Preparation of the land for settlement in
the Papatotara district, Wallace county.

3.5 Oats - An Alternative to Refrigeration

One of the main characteristics of the Southland agricultural economy during the late nineteenth century was the importance of grain crops as an alternative to refrigerated pastoral farming. The development of grain economies in the frontier zones of the nineteenth century was a common occurrence and the general causes which transformed the mid-latitude grasslands into grainlands are well known. The role of wheat as a pioneer staple, the impact of cheap railway transport from the interior to the coast, the development of new agricultural machinery and the expansion of urban markets all played a major role in the penetration and settlement of the prairie regions.

However, rather little attention has been paid to the roughly analogous situation in Southland where a grain economy developed in the last two decades of the nineteenth century as a viable alternative to intensive pastoralism. In the early 1880's, wheat was grown extensively reaching its peak of 41,700 acres in 1883; but it declined almost immediately afterwards to insignificant levels. This early interest in wheat was an offshot of the bonanza wheat farming in Canterbury but it was soon found that climatic conditions in Southland were unsuitable for the common wheat strains of the period.

While wheat production declined in the 1880's, the production of oats continued to rise and eventually oats became the leading agricultural commodity of Southland (figure 15). The motives for growing grain in preference to wool, meat or dairy products are complex. Oats need not be a rival to pastoralism but could be complementary to it on many large estates. A crop or two of oats could pay for the cultivation of the tussock and the conversion of the ploughed land into sown English grasses. The high yields, the suitable climate, the low cost of labour during the long depression and the introduction of American reaping and binding machines could make the cultivation of large areas of oats an attractive proposition for the managers of large lowland runs. For while the price of oats were mediocre, the return from grain generally exceeded the return from wool and mutton production on the same land.

Grain was not only associated with the large scale pastoral estates but was also grown on many small farms. Grain was a safe crop under Southland conditions and prices did not fluctuate as widely as they did for meat and wool. Furthermore, a strong tendency among British settlers in the New World is to attempt to reproduce the agricultural pattern of the home country. Clark (1949) has argued that most immigrants to New Zealand were drawn from classes with little or

no agricultural ability in order to explain the high degree of flexibility in New Zealand agriculture.¹⁹ However, a fairly strong bias did exist towards arable farming and in Southland with its large Scottish population, this meant that the agricultural system turned towards the production of oats as a staple grain crop.

By using railway data on the goods shipped from each station,²⁰ it is possible to get a closer insight into the situation in Southland and trace the regional variations in production through time. The initial concentration in grain (figure 16) was in the Waimea-Waikaka plains north of the Hokonui hills with a secondary concentration in the small farming districts between Invercargill and Otautau. By 1890, the pattern had been slightly re-arranged. Production was

19. A.H. Clark, The Invasion of New Zealand by People, Plants and Animals (New Brunswick, 1949) pp.156-166.

20. Maps were prepared from data contained in "Railways Statement - Return Number 12", A.J.H.R., D-2 for the relevant years.

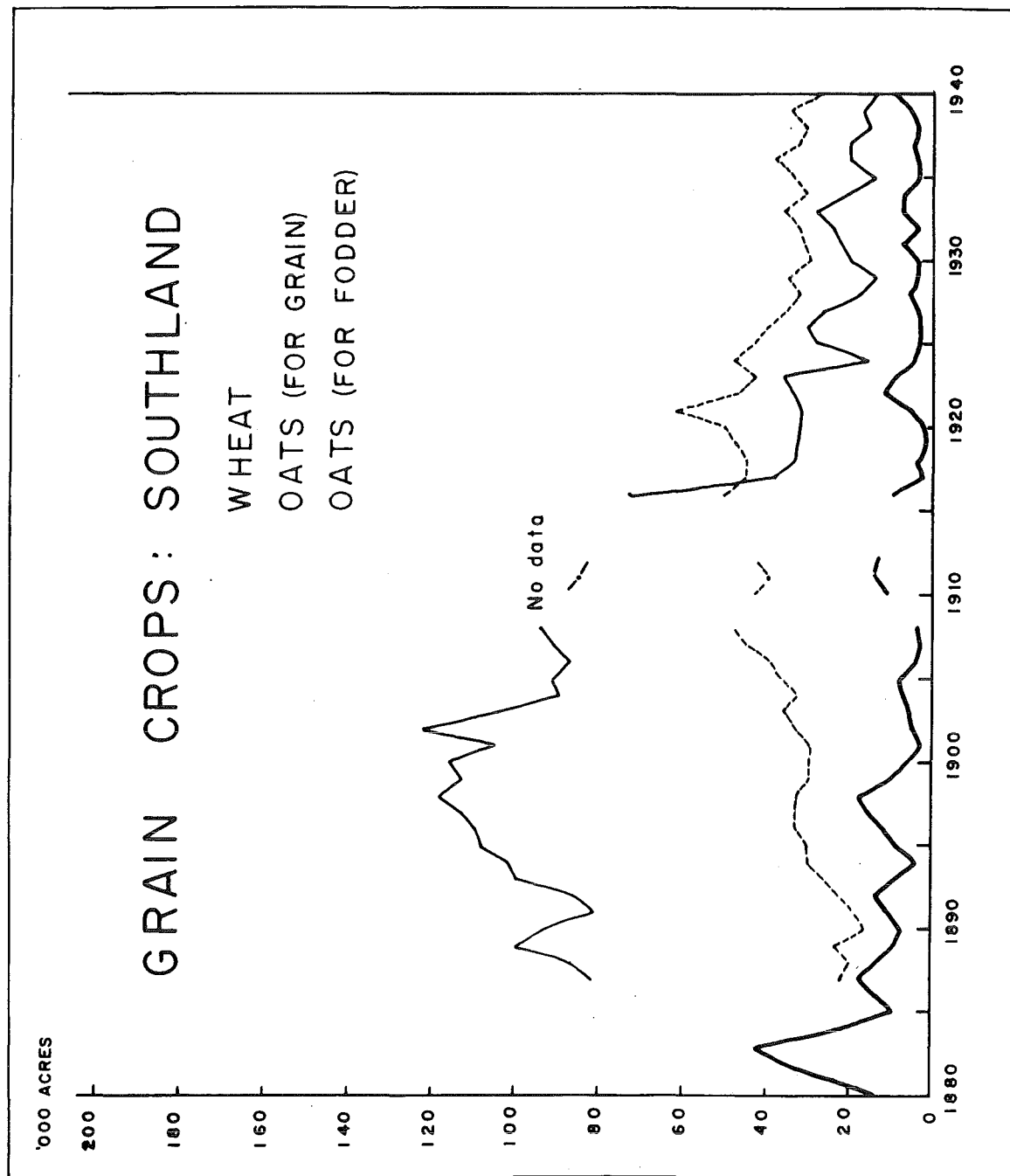


Figure 15

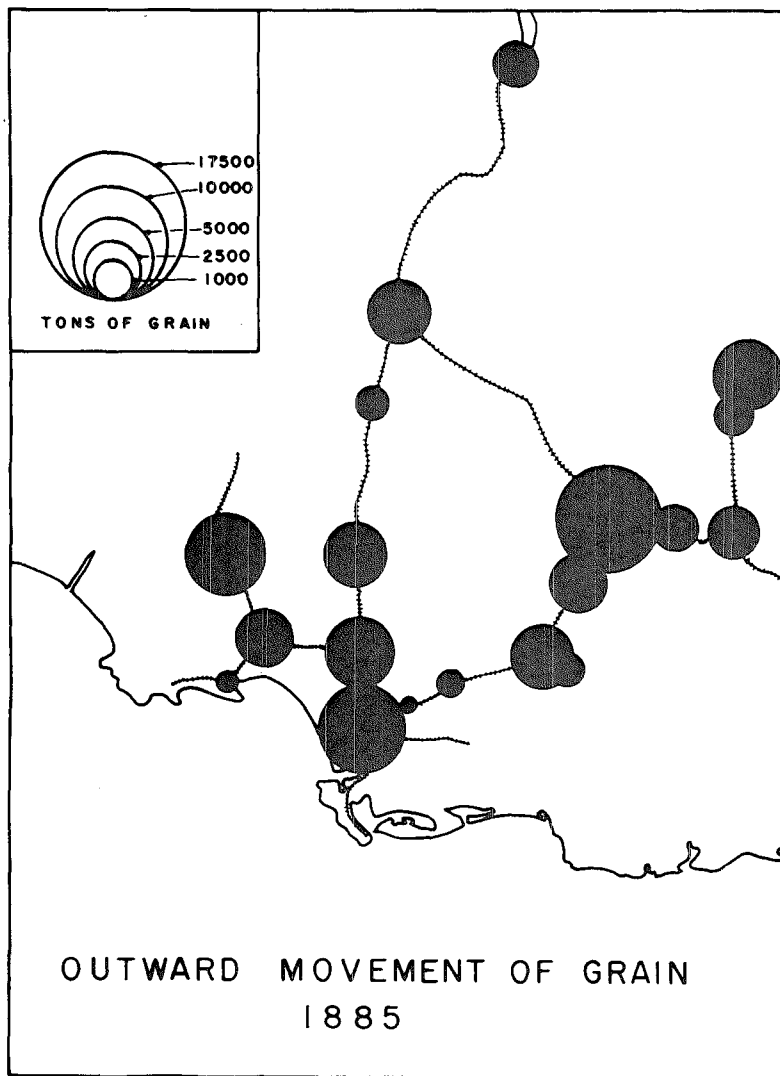


Figure 16

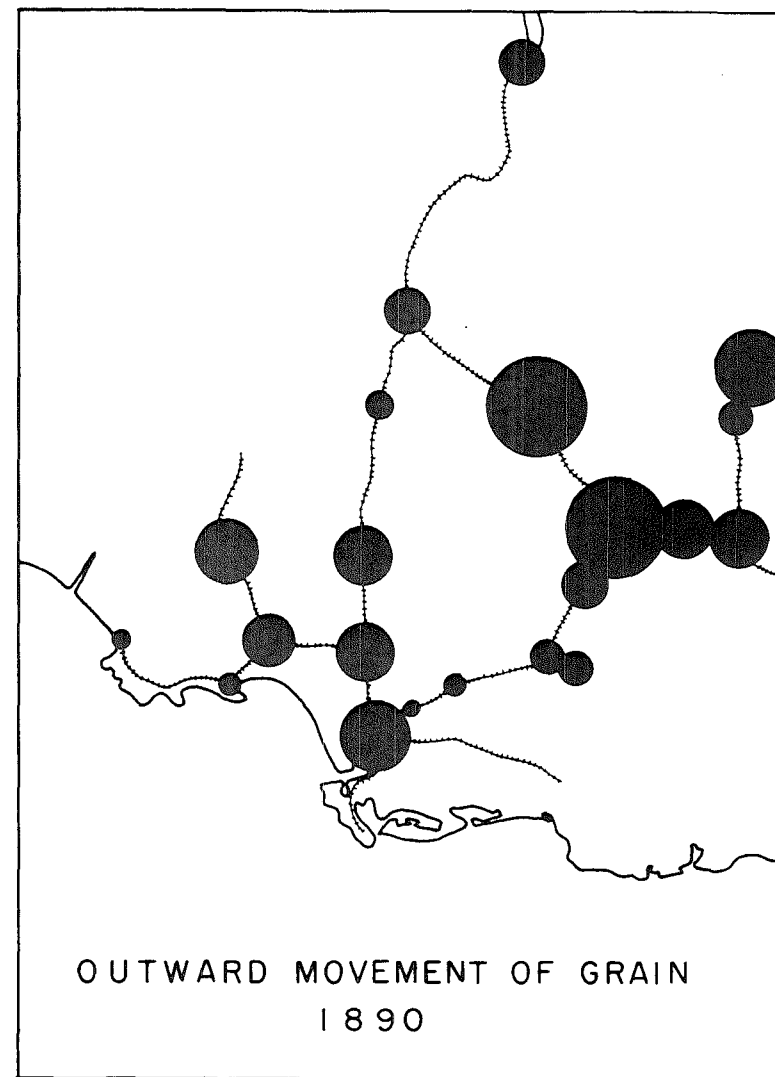


Figure 17

increasing on the Waimea plains and decreasing in the Aparima district of western Southland as a result of the diversification of the latter region into intensive sheep and dairy farming (figure 17).

The differing influence of the two major land companies can be seen in the contrast between the Waimea plains holdings of the New Zealand Agricultural Company which stressed grain crops and the Edendale Estates which concentrated more on intensive pastoralism. The contrast between the two areas was increasing. In 1885, the amount of grain loaded at Edendale station was a considerable fraction of the grain handled at Gore (Gore being the station where the goods coming off the private Waimea Plains Railway were put on the Government rail system). In 1890, the amount handled at Edendale was insignificant compared to the vast increases noted at Riverdale and Gore. The Waimea Plains Estate was the centre of the oat production of the province. Much was done by cropping tenants who made bids for the right to take off a crop of oats but much was also done on the account of the company. On the other hand, the Edendale Estate was systematically discouraging such a system of cropping since it was totally unsuitable for the area. Some oats were grown in this district but they were used as inputs of feed into the local farm economy rather than shipped by rail

to markets in other parts of New Zealand and overseas. The company eventually wrote off its investment in a "number of steam engines for working ploughs and harrows - such a system of cultivation being entirely unsuitable to Edendale" by selling them to local sawmillers.²¹

In the 1890's, between twenty and fifty percent of the total output of oats were exported, mainly to Britain and the Australian colonies. The proportion of Southland oats exported tended to be higher than the national average due to its unfavourable location with regards to the main internal markets and the regions relatively high concentration in oat production. During the late 1890's, a wave of protectionism swept some of the Australian colonies and New Zealand's exports of many agricultural products were severely damaged. The effect of the closing of the lucrative markets of Victoria by a duty of three shillings per cental can be seen in the following table showing the destination of oat exports from New Zealand.

21. W.D. Davidson, "A Sketch of His Life...", (Edinburgh, 1930), p.87.

TABLE 7Destination of New Zealand Export of Oats²²

	<u>1889-1891</u>	<u>1899-1901</u>
United Kingdom	26.7%	5.9%
Victoria	27.0%	10.4%
New South Wales	36.2%	16.0%
Queensland	2.7%	1.5%
Western Australia	1.3%	5.0%
Cape Colony	-	9.7%
Natal	-	50.4%
South Australia	3.7%	-

The effect of the Victorian tariff, and the subsequent Commonwealth duty was delayed by the impact of the

22. Sources are the "Trade and Interchange" statistics in the New Zealand Statistics for the relevant years.

Boer War. In 1900, the province was entering into a boom period in the production of oats, associated with the large exports to South Africa caused by the Boer War. It is hardly surprising that oat production was stimulated by the large purchases of oats made by the Imperial Government at three shillings a bushel, a price nearly a shilling more than the local price.²³ Oat production in this period (figures 18 and 19) was more intensive in the districts of western Southland where a certain flexibility existed in the agricultural system. On the highly fertile soils between the Aparima and Oreti Rivers, farmers could adapt to the changing balance of costs and prices more readily than they could in the drier, less fertile areas of the Waimea plains. Expansion and contraction in grain production occurred in western Southland while production north of the Hokonui's fluctuated very little. It had been the western districts that had seen the largest decreases in sheep numbers in the period 1895-1905 (figure 12) and judging from the pattern of production of oats, it is fairly evident that a trend

23. "Oats for South Africa", A.J.H.R. (1901) H-27.

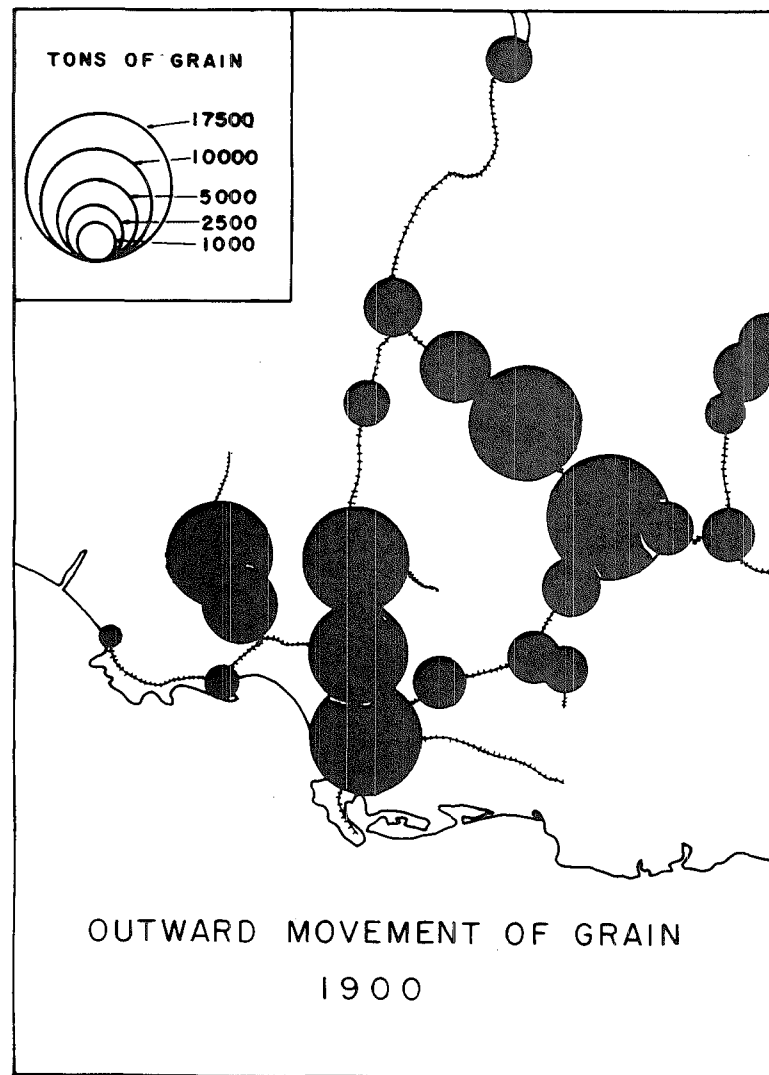


Figure 18

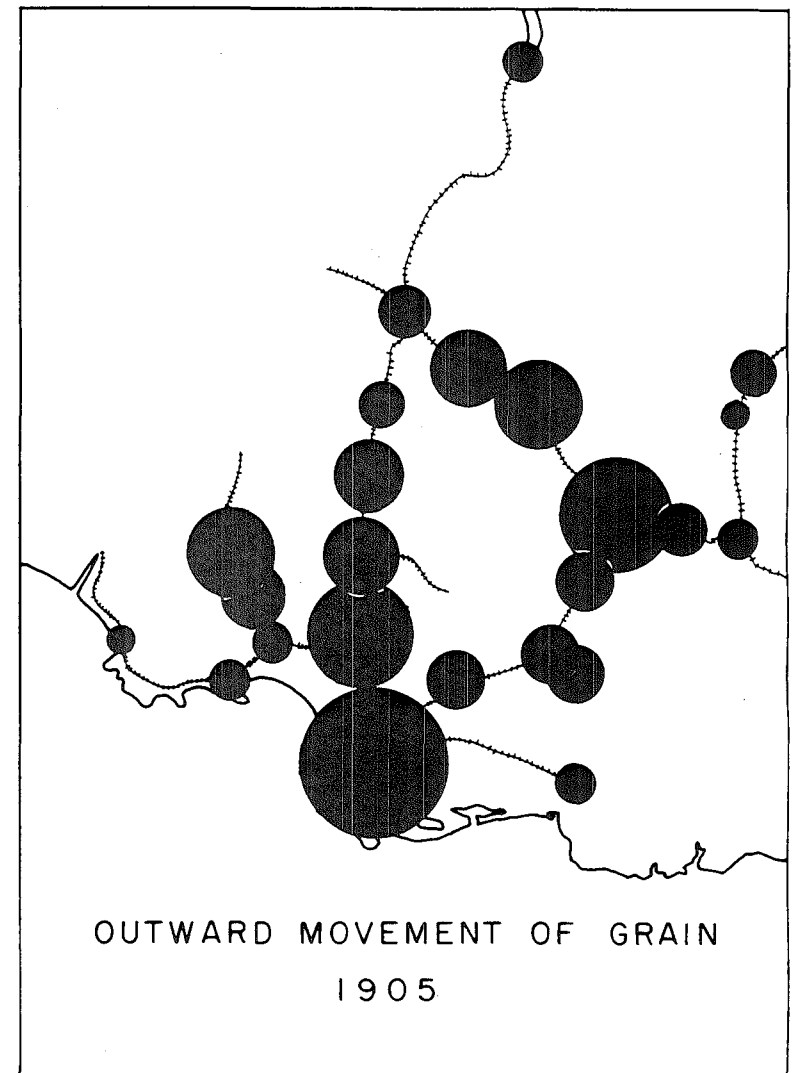


Figure 19

existed for a short period away from intensive pastoral farming into the production of cash grains.

If this trend had remained unchecked by other developments, it is possible that the farming system that would have evolved in Southland would be similar to that found in Canterbury. However, the opinion in 1906 was that cropping had had its day in Southland. The lack of rotation and the infestation by weeds had decreased soil fertility and made cultivation difficult and the Boer War boom was a temporary aberration - the last fling of an agricultural pursuit on the verge of extinction.

CHAPTER FOUR

THE CONSOLIDATION OF REFRIGERATION 1906-1925

4.1 The Heyday of "High Farming"

The period 1906-1925 was an era when the style of farming introduced into Southland by the development of refrigeration continued to expand, but this expansion took place within the confines of the traditional British system of agriculture. Both the best and the worst of British agricultural methods were present. Not all farmers were using the methods of "high farming" and many were content to continue using the traditional inefficient and unproductive methods that survived in many areas of Britain. There were a number of significant advances in agricultural techniques and a number of shifts in emphasis of production but in many cases these were more a reaction to declining soil fertility than to a desire to increase production. Because of the higher prices which prevailed for agricultural products after 1896, farm incomes had increased considerably and it was not until the stresses of the post-war depression that Southland farming began to cast off its spirit of complacency and to crit-

ically examine the serious retrogressive elements present in the system.

The dichotomy between the "high farming" methods used by some farmers and the continuing use of traditional methods by many others is the basic theme of this period. To a large degree, it would be true to say that the most prosperous farmers of Southland were carrying on a modified form of "high farming" involving the production of pastoral products from a mixture of sown grasses and supplementary fodder crops rather than from either the exploitation of the tussock grasslands or from the use of intensive grassland farming.

"High farming" is a rather nebulous and ill-defined concept with a wide variety of implications. It can be shown that Southland farming of the period exhibited a number of the basic features of high farming as known in Britain. The growing importance of meat and dairy products to obtain maximum advantage from the changing nature of the market, the use of lime and artificial fertilizers, and the spread of land drainage were all phenomena associated with "high farming" in Britain. These techniques were applied to Southland but many others were inappropriate to the Southland situation owing to its remoteness from the markets, the higher costs of labour and the lower costs of land. Southland agriculture in this

period strongly resembled a Scottish system of high farming recreated in a semi-frontier zone with a number of modifications to adapt it to the local social and economic environment. Co-existing with the "high farming" was a considerable amount of "low farming" and the balance between the two shaped the patterns of expansion during this period.

The importance of cultural heritage and the lines of information flow in determining the agricultural orientation of a recently settled region cannot be overstressed.¹ There is relatively little data in which the impact of cultural preference upon the agriculture of New Zealand can be measured. The biographical sketches of prominent farmers contained in the Cyclopedia of New Zealand (1905) can provide some information on this problem. The selection of farmers is strongly biased towards the most successful and important in a locality but an examination of a sample of one hundred

1. This theme has been strongly considered in A.H. Clark's (1959) Study of the agriculture of Prince Edward Island.

farmers reveals some interesting patterns as regards place of birth and previous agricultural experience. The table showing place of birth (table 8) is complete and probably fairly representative of the whole range of Southland farmers at the turn of the century. Nothing in it disputes the religious breakdown of the rural population given in the 1906 census except that there may be more "Irish" and fewer "English" farmers.² The data relating to previous farming experience is more dubious since these details were often not mentioned.

2. Religions in Southland and Wallace 1906

Anglican	21.4%
Presbyterian	51.4%
Methodist	5.3%
Roman Catholic	14.8%

TABLE 8Southland Farmers in 1905³

	<u>Place of Birth</u>	<u>Previous Farming Experience</u>
Scotland	54%	20%
Ireland	17%	7%
England	12%	3%
New Zealand	9%	-
Australia	4%	1%
Other	4%	2%

A number of interesting points emerged from an examination of this data. Nineteen percent of the farmers in the sample had some form of Australian experience though not

3. The sample was taken from the Cyclopedia of New Zealand, Vol. IV (Christchurch, 1905) pp.878-1116.

always in farming. The number of ex-goldminers who migrated from the Victorian diggings to Central Otago and subsequently took up land is fairly high. Secondly, even if many farmers did not indicate previous farming experience overseas, it may be possible that only half of the settlers had a prior knowledge of farming with obvious consequences. Thirdly, even as late as 1905, the vast majority of farmers had been born overseas, the majority in Scotland.

Reinforcing the cultural origins of the settlers were the strong links in farming communications established between Scotland and Southland. The agricultural columns of the Invercargill newspapers reveal the strong impact of Scottish agricultural developments on the local scene. Is it really surprising that Southland attempted to imitate the best features of Scottish high farming when over half the farmers came from Scotland and the main source of news about agricultural progress was material reprinted from the North British Agriculturalist in the local press?

The steady rise in prices for agricultural and pastoral products that had been evident since 1896 enabled refrigerated pastoral farming to consolidate its hold on the Southland plains by the outbreak of the Great War. In this chapter an

examination will be made of the spread of dairy farming, the changing focus of the sheep farming industry and the final elimination of oats as a rival to refrigerated pastoral farming. In the course of this examination of how the three main types of farming economy evolved during the long period of apparent stability between the two major revolutionary eras, a balanced discussion will be maintained of the elements of progress and the elements of backwardness present in the agricultural system of Southland.

4.2 The Frozen Meat Trade - An Era of Stability

The sheep returns reveal a rapid increase in sheep numbers from the 1904-05 low until 1910 when a period of relative stability was imposed upon the sheep industry of Southland (figure 20). Stability in this context refers only to the total number of sheep in the provincial flock and not to the purpose for which these sheep were kept. The trend towards fat lamb at the expense of mutton and wool which had begun in the nineties of the last century continued to gain momentum. However, such limitations upon the expansion of sheep farming as the deterioration of the natural grasslands and the growing competition from dairy farming combined to keep the number of sheep from fluctuating significantly until the end of the war. What were the causes of this decade of

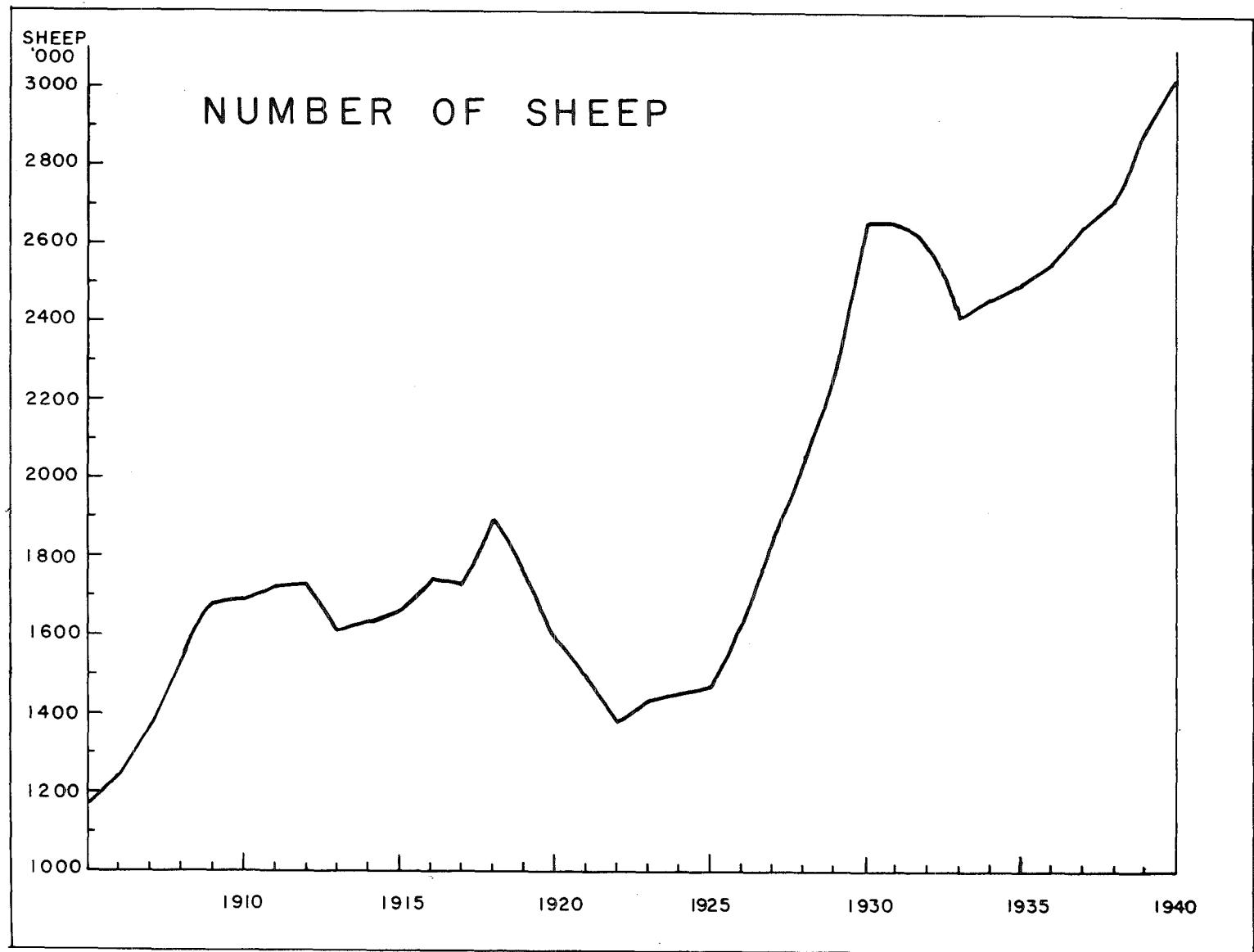


Figure 20

stability? By dividing Southland into zones separating the lush sown-grass pastures of the lowlands from the natural tussock grasslands of the downs and high country, it can be shown that two different forces were at work to maintain the stability of sheep numbers.

The situation on the low country was determined by the relative price structure and profitability of the three major forms of agricultural pursuits. It will be shown that grain farming was entering into a period of decline, that sheep farming was stabilized and that dairy farming was expanding and consolidating its hold over a large area of the plains. Between 1910 and 1919 there were no significant changes in stock numbers. The 1917-18 upswing (figure 20) being accounted for by the lack of shipping due to wartime losses and the consequential backing up of the export system as cool-storage space became unobtainable. The distribution of sheep through space was also stable though there was a change in the focus of production. In 1919, new forces associated with the postwar boom and the subsequent depression led to a decline in stock numbers that eventually stimulated the great increases caused by the swing to grassland farming after 1925.

The increases between 1905 and 1910 occurred mainly on the lowlands. In 1905 there were two core areas for sheep farming, one in the Drummond district of Wallace county and

the other in the Chatton-Otama area north of Gore. There were also two regions where there was intensive production of dairy products and which can be considered core areas for the spread of dairying throughout Southland. The Thornbury dairy area and the Edendale district lay to the south of the two sheep core regions. The four core areas in 1905 were adjacent to each other but overlapped very little. By 1910, the expansion of both forms of pastoral activities through the application of the principles of "high farming" caused the areas devoted to the two forms of farming to merge though the four focal regions were still maintained (figures 21 and 23). The greater overlap represented a decline in regional differentiation but a continuation of a degree of regional specialization. The production of fat lambs and the requirements for dairy farming were similar. In many cases, sheep and cattle were grazed in the same paddock and many farmers combined an interest in sheep with an interest in cattle.

By 1910, sheep numbers in Southland had recovered from the Boer War recession and a period of stability was about to commence. An examination of the distribution of sheep in 1910 (figure 21) shows that the patterns of 1895 (figure 11) had been largely restored though there was some noticeable

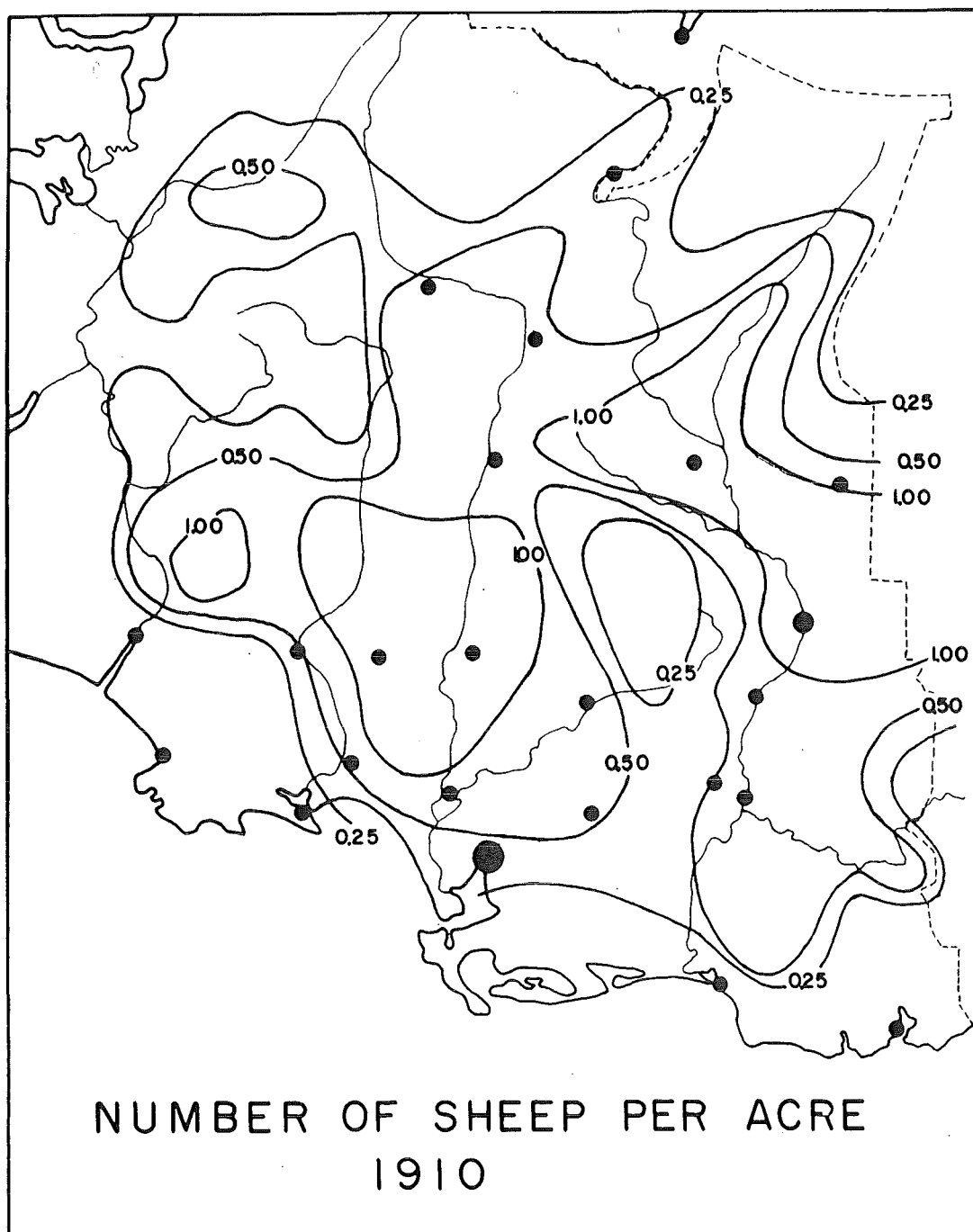


Figure 21

intensification of production on the Waimea plains and in the Winton district. This intensification was brought about by the application of some of the principles of "high farming", especially the use of supplementary fodder crops, land drainage and the liming of pasture. Between 1905 and 1910, large areas formerly devoted to the production of oats were converted into turnips, the increasing acreage keeping pace with the rise in sheep and cattle numbers. Liming and the drain plough were important innovations brought out from Britain in the late nineteenth century but only slowly gained acceptance. For instance, the drain plough was greeted by many farmers with "credulity if not derision."⁴ since they believed that the pipe formed by the plough would soon collapse. However, the drain plough offered a cheap means of draining much marginally wet land. Ditching and tile drains could handle some of the wetter districts and once the land was drained, the application of heavy doses of carbonate of lime would bring it into full production.

Sheep numbers in the decade 1910-1920 were stable. Rising butterfat prices and the greater return per acre

4. Southland Times for January 31, 1894.

(important to the many small farmers on 200 acre blocks) shifted production in favour of dairy farming. However, beneath the layer of apparent stability were a number of major changes in the emphasis of sheep production. A greater interest was being expressed in fat lamb at the expense of mutton and wool. This is clearly shown in table 9 which describes the changing nature of sheep breeds in the province.

TABLE 9

Sheep Breed in Southland 1900-1925^{3a}

<u>Breed of Ram</u>	<u>1900</u>	<u>1905</u>	<u>1910</u>	<u>1915</u>	<u>1920</u>
Merino	7.4	5.5	4.7	1.8	3.0
Lincoln	11.3	2.9	3.3	0.7	0.7
Romney	42.4	29.5	44.0	72.1	64.2
Border Leicester	30.8	39.0	43.7	21.5	21.3
English Leicester	6.7	7.2	3.2	0.9	0.9
Shropshire	1.7	2.1	1.1	0.5	1.8

The Merino and the Lincoln, the main wool producing sheep were being eliminated. The decline of the Lincoln was

3a. "Annual Sheep Returns" A.J.H.R., H-23.

very rapid as it could not compete against butterfat in the low, wet country near the coast. The Merino on the uplands was also being replaced by the more versatile Corriedale and the Romney. The main trend was towards the Romney as the fat-lamb ewe and the Border Leicester which was used for fat lamb production though more suitable for mutton.

Some of the apparent confusion in the table may be attributed to the unusual economic circumstances during the period. The decline of the Romney in 1905 is explained by the oat boom which drove sheep production from large areas of the plains. The Great War also forced the industry to change its focus, temporarily and against the normal direction. War conditions made the export of mutton rather than fat lamb necessary and the temporary swing towards mutton seen in the killing statistics of the three Southland meat works⁵ is an interruption in the otherwise gradual swing towards fat lamb.

The postwar boom saw a decimation of the provincial flock as large numbers of sheep and lambs were slaughtered

5. V.A.S. Powley, The Southland Frozen Meat and Produce Export Company, unpublished M.A. thesis (University of New Zealand-Otago, 1954) Appendices.

to take advantage of the high prices. When the prices fell, exports continued at a high level since farmers had incurred heavy obligations during the period of false prosperity and were forced into killing off their breeding stock to meet their debts and preserve their living standards.

In the high country, the situation was somewhat different. On the rolling downlands of Southland with a cover of tussock and occasional area of sown grass, sheep production and the raising of beef cattle were the only possible forms of production. In these regions, the orientation of sheep farming was also changing. A greater trade was developing in the sale of breeding ewes, and stock from areas as remote from railway stations as the Blackmount and Merrivale runs were being sold as store sheep in 1911. The integration of the uplands into the fat lamb economy of the plains was a slow process hampered by the continuing and unchecked deterioration of the tussock grasslands.

Rabbits, the overstocking of pasture, the after effects of burning, and the shockingly bad habits of pasture management all contributed to a declining carrying capacity. In 1920, a commission was set up to investigate the state of pastoral lands and concluded that "lowland farming in New Zealand has made great strides forward" but that "the mountain sheep station has not merely shown no advance but has

gone backwards."⁶ The causes of this deterioration are well known but the attitude of the pastoral community which permitted the grasslands to be nearly destroyed has never been adequately explained. Ignorance of proper farming practices was certainly a major factor but as the high country runs contained many of the most highly capitalized farms in the province, one would expect a higher than average level of agricultural competence. The damaging effects of burning can be excused since there was still considerable debate over the issue and it was even mildly supported by the Pastoral Lands Commission. But many other factors show an abysmal lack of concern by many runholders towards the land. The catch of rabbits in Southland varied according to the price of pelts suggesting that rabbits had become a subsidiary pastoral product. The overstocking of runs was chronic. It has been suggested by Clark (1949) that the high level of indebtedness of the runholders to stock and station agencies forced many farmers to use bad farming practises as they were always on the verge of financial disaster.⁷ Secondly,

6. "Southern Pastoral Lands Commission," A.J.H.R. (1920)

C-15, p.14.

7. A.H. Clark, The Invasion of New Zealand by People, Plants and Animals, (New Brunswick, 1949) p.264.

there is the possibility that the leasehold tenure on crown pastoral lands discouraged improvements such as surface sowing or the regeneration of pasture through light grazing or rabbit control since there was no compensation for these upon quitting the run. Thus in 1905 and again in 1920, evidence was presented to Royal Commissions regarding the level of agricultural practices on the grassland. In 1905, John Hay, the Commissioner of Crown Lands for Southland testified that runholders used the refuse from threshing mills and seed cleaning machines for surface sowing which is certainly a long way from the practice recommended by an experienced farmer who estimated that surface sowing with good seed would cost at least ten to fifteen shillings per acre for seed alone but it could be expected to raise carrying capacity by at least twenty five percent.⁹

8. Evidence of John Hay, "Report of the Royal Commission on Land Tenure," A.J.H.R., (1905) C-4, p.20.

9. Evidence of John McLean, "Report of the Royal Commission on Land Tenure," A.J.H.R., (1905) C-4, p.31.

4.3 Dairy Farming - An Intensification of Production 1906-1925

By 1905, the pioneer phase in the dairy industry of Southland was passing and dairy farming was beginning to consolidate its hold upon the plains. Eventually, it became the predominant agricultural activity over large areas and turned Southland into one of the main cheese producing regions of New Zealand. The methods by which this industry rose to regional primacy are phenomena of considerable geographical interest and will be examined with reference to the changing intensities of production resulting from the favourable economic circumstances and the application of a limited number of the principles of high farming.

The period 1906-1925 represents a distinct era in the evolution of the dairy industry of Southland. It was a period when dairy farming was still "extensive" in that increases in production were a result of a larger number of cattle rather than a greater output per cow. The number of dairy cattle could be increased in two manners. The first involved the spread of dairying into new districts. The second took place by increasing production within the old areas. The size of milking herds could be increased by turning more paddocks over to the production of butterfat, by the use of



Plate 3 The Expansion of Dairying

Mable Bush Co-Operative Dairy Factory,
Southland County.

more supplementary feed and the liming of pasture to increase the quality and quantity of the available feed. The reluctance of many farmers to rely on large dairy herds as a source of livelihood was diminished by the invention of the milking machine and the rising price of butterfat. At a shilling a pound in 1911, butterfat production became an attractive proposition to many more farmers and the number of suppliers to dairy factories grew steadily larger.

Although the true "pioneer" phase of the dairy industry had passed, dairy farming still played a considerable role in the closer settlement of the land. In the early 1900's, dairy farming had been in a state of recession and many factories had been forced to close during the oat boom. In 1905, a return to dairy farming was exemplified by the subdivision of the Edendale Estate for small dairy farms. In this area, it had been common for many company tenants to receive from "four to six times their rent from the sale of milk to the factory plus income from crops and surplus stock"¹⁰ and the competition for blocks was intense. By 1910, nine new fact-

10. "Edendale Settlement", Department of Lands (Wellington, 1905).

ories had been established around the fringes of the old dairying district (figure 22) and a number that had been closed during the recession had reopened.¹¹ Expansion continued as twenty eight new factories were opened in the next five years. This pre-war phase (1905-1915) marked the greatest regional expansion of dairy farming with factories located in every conceivable area of the province. New factories would continue to be opened and production would be intensified but dairying had reached its maximum practical limits by 1915. New factory construction had been concentrated in three main areas: the Waikaka plains, the Invercargill-Winton Road and along the fringes of the Seaward Bush. Dairy factories were even established by the owners of large runs in the Waiau Valley who tried to establish private dairy colonies in imitation of the Edendale model.

The traditional method of analysing changes in the dairy industry has been to examine the changing location of factories. This criteria gives only a rough guide to the

11. Location of dairy factories are taken from Stone's Otago and Southland Directory.

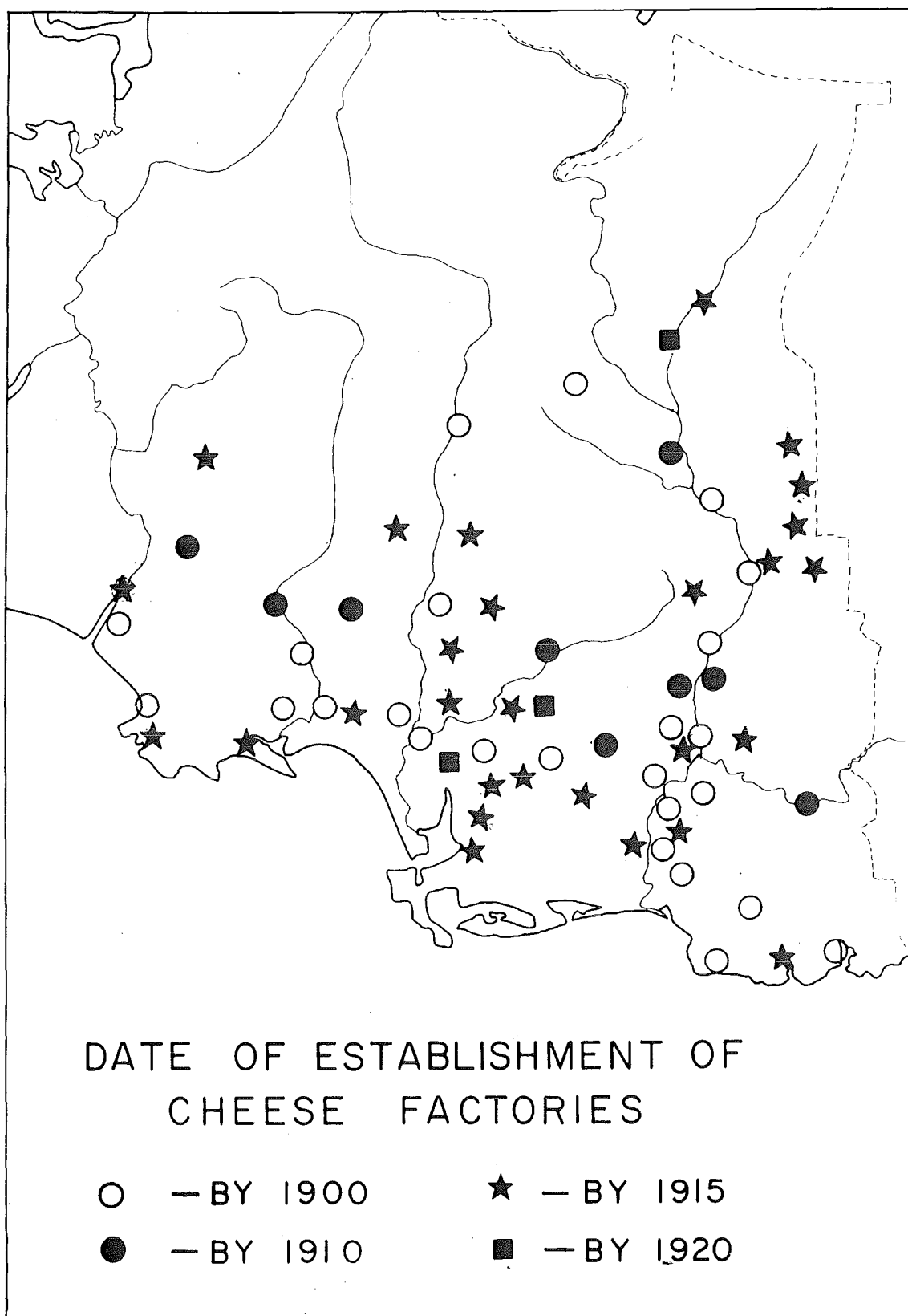


Figure 22

intensity of production. It has proven possible to construct a number of maps showing the intensity of cheese production in terms of tons of cheese produced per square mile. By arbitrarily defining a low level of regional concentration in terms of a production of two tons per square mile and a moderate level of regional specialization as a production of four tons per square mile, it is possible to examine the regional patterns and the changes which took place in greater detail.¹²

By 1910, the dairy industry had recovered from the temporary recession associated with the oat boom of the Boer War years. A map showing the intensity of production for the 1910-11 season reveals two main core areas with a possible third (figure 23). The Edendale area was the centre of the most intensive production of dairy products with intensive dairying along both banks of the Mataura from Gore to Pine Bush, with an extension westwards towards Woodlands. The secondary areas of intensive cheese production were in the Thornbury district and around the town of Winton.

12. These maps were prepared from data in the Annual List of Creameries, Factories, Private Dairies and Packing Houses, New Zealand Department of Agriculture, Dairy Division.

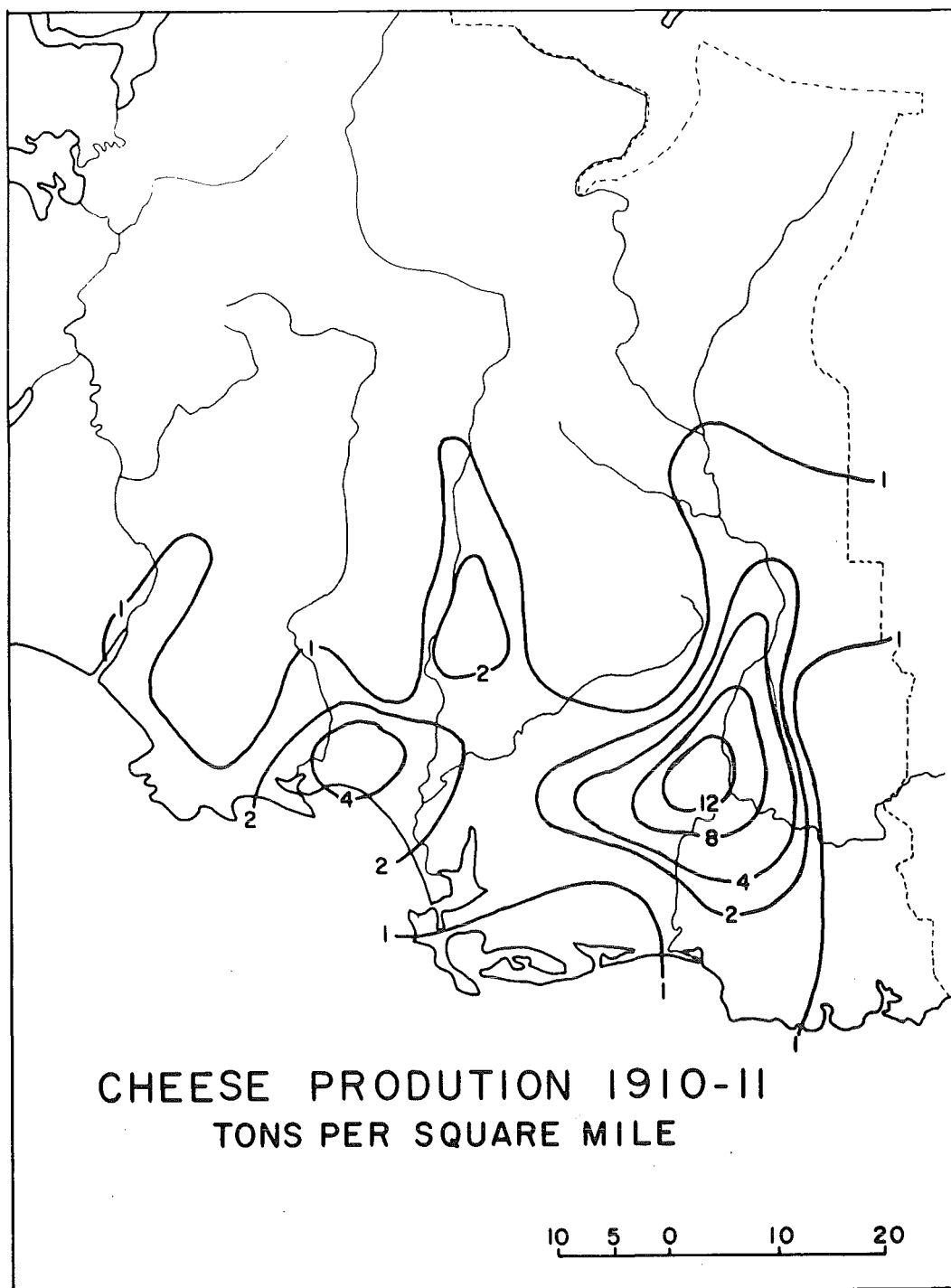


Figure 23

The pattern for the 1914-15 season (figure 24) reflects the expansion and intensification in dairying which took place immediately prior to the first World War. The core regions had not increased their production to any significant degree but the intervening areas had doubled output by increasing the number of dairy cattle. There were a number of limitations upon the intensification of cheese production within the core districts such as the cost of liming and the low quality of dairy cattle. Furthermore, the dairy farmers were contented with their rising standard of living and did not feel any need to increase production.

During the Great War, the conversion to dairy farming continued unabated. The sudden surge in the prices of butter and cheese and the growing shortage of harvest labour tempted many farmers to switch from grains and fat lamb into the production of dairy products. The patterns of intensity for the year 1919-20 (figure 25) at the height of the post-war boom are not significantly different from the patterns of the pre-war period. The only noticeable change is the decline of dairying in the Winton district.

However, the decline in dairy prices in 1921 jolted the Southland dairy farmer out of his complacency. For twenty years, farming had basked in the glow of the steadily rising prices for agricultural and pastoral products on the

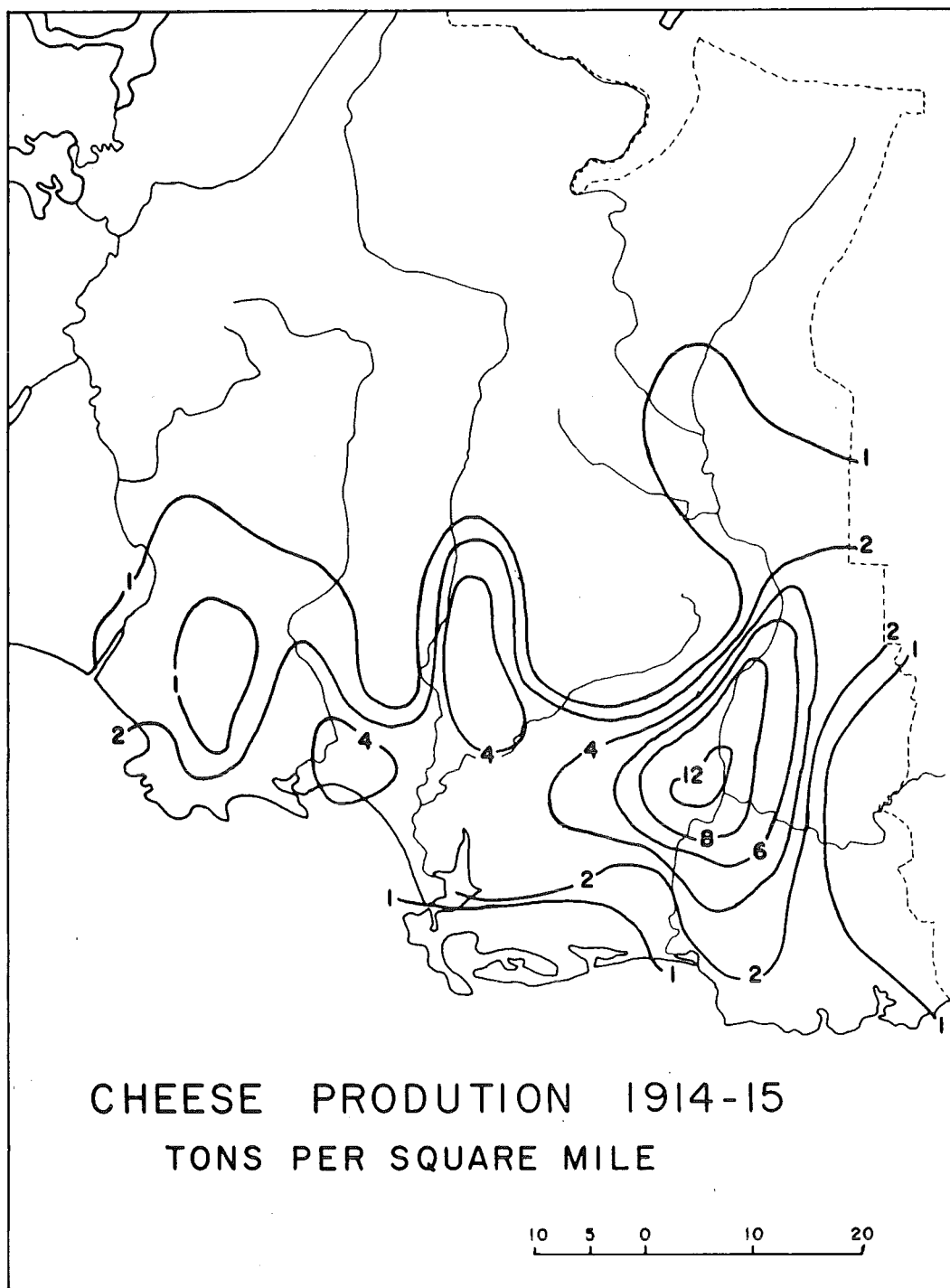


Figure 24.

British market and the shock of falling prices forced the farmer to reconsider his methods of production. Expansion had been based upon increasing the area devoted to dairying, now it began to be based on the better management of the herd

The first reaction of the farmer to falling prices had been to increase output. This was done by increasing the size of the milking herd by stopping the normal culling of aged and inferior animals. This had the effect of decreasing the already pathetically low quality of the dairy herd in the province. But once prices began to recover in 1922, the farmers began a heavy culling campaign. This is seen in the changing nature of the dairy breeds in the province.

TABLE 10

Dairy Breeds in Southland ¹³

	<u>1918</u>	<u>1921</u>	<u>1924</u>	<u>1928</u>
Jersey	3.3%	2.2%	2.9%	8.2%
Friesian	21.8%	13.8%	21.2%	28.7%
Ayrshire	18.0%	8.0%	11.5%	16.5%
Milking Shorthorn	57.5%	69.2%	62.3%	46.2%
Other Dairy	1.7%	6.8%	2.2%	0.5%

13. Source N.Z.O.Y.B. 1918 and Agricultural and Pastoral Statistics for 1921, 1924 and 1928.

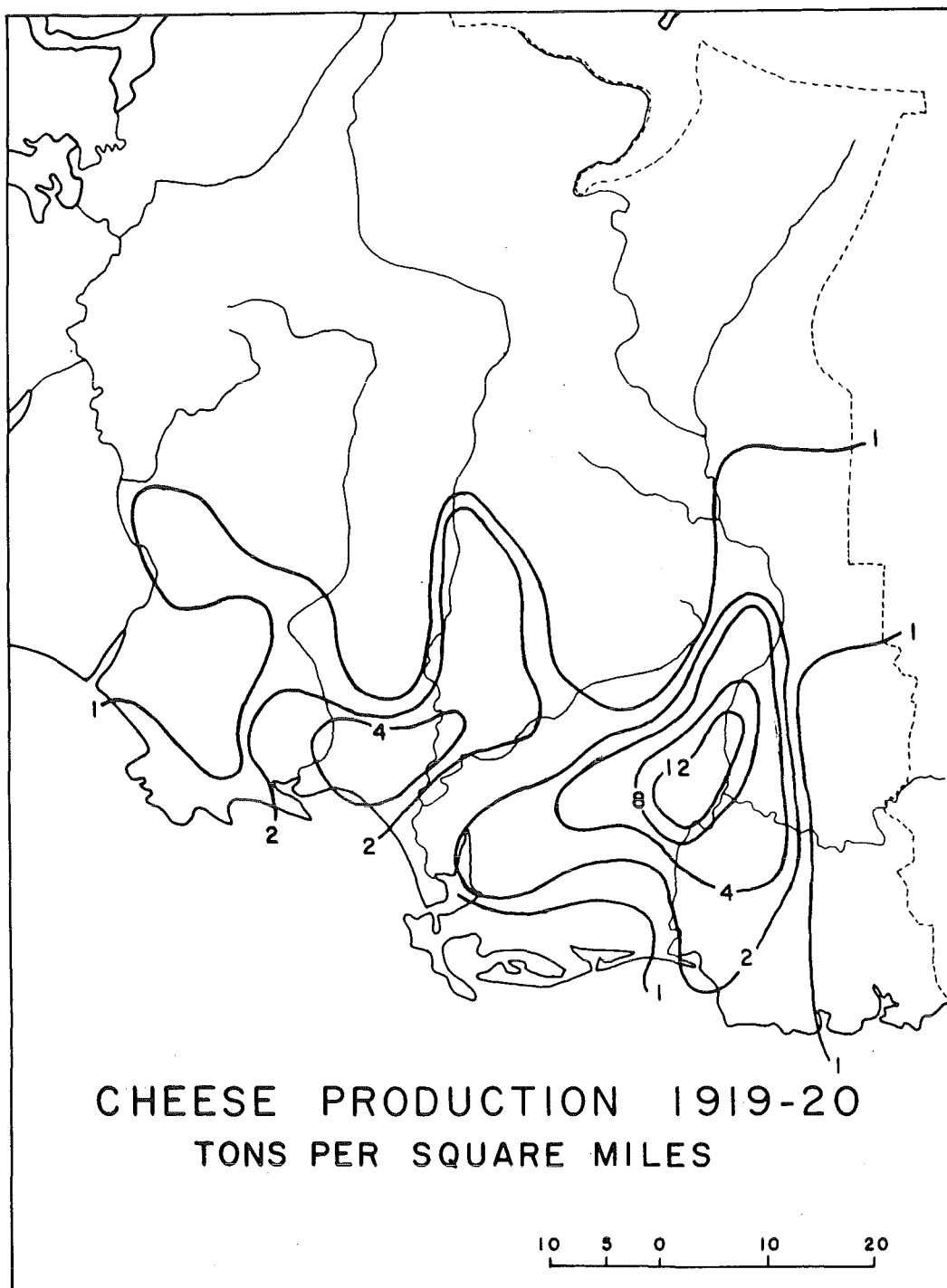


Figure 25

Before the 1920's, the Southland dairy farmer had been affected by the residual effects of the low quality of cattle imported into the province during the last century. The quality of the milking Shorthorns was poor but the breed was popular since it was a dual purpose animal producing a heifer fit for milking and a steer suitable for fattening. The number of milking Shorthorns and "other dairy breeds" (really beasts of no discernible ancestry) increased during the period in the early 1920's when culling had ceased. They were rapidly eliminated once the farmers resumed culling and aimed for a more specialized animal. The trend was towards the Friesian and the Ayrshire, the best breeds for the production of cheese. The use of the butterfat system of payment for milk in the cheese factories of New Zealand encouraged some farmers to use the Jersey though it was not especially suited for the local environment nor for the production of high quality cheese.

In 1924-25, the pattern of the intensity of cheese production reflected the more intensive dairy farming of the period (figure 26). Production was increasing over the entire region especially in the core zones and in the peripheral districts of central and western Southland.

The stresses of the post-war depression broke many of

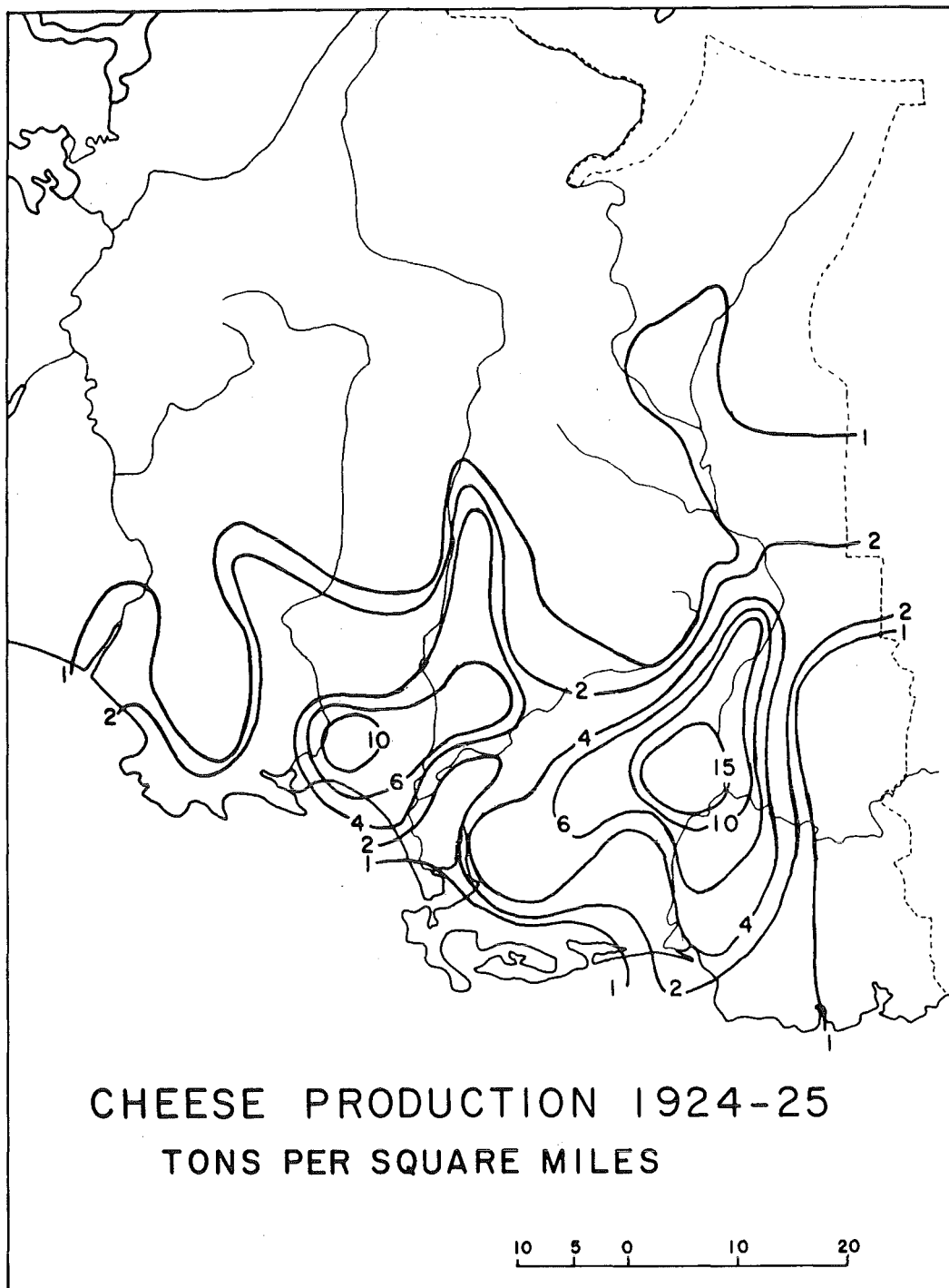


Figure 26

the conservative habits of the Southland dairy farmer. In terms of methods and breeds, the Southland dairy farmer was still the most backward in New Zealand but interest was now being exhibited in the ways in which the situation could be improved. The adoption of herd testing, the use of better quality breeding stock and the developments in grassland farming practices would remove many of the barriers to progress in Southland dairy farming. The only remaining problems of significance would be the short dairy season (about thirty six - forty weeks) and the large number of small and uneconomic factories. In 1925, dairy farming was at its maximum areal extent with sixty four dairy factories scattered throughout the province. The patterns of the next decade would see a contraction of the area devoted to dairying but a great increase in output from the main dairying regions.

4.4 Oats - The Elimination of the Rival to Pastoral Farming

The decade prior to the first World War saw the final elimination of oats as a rival to refrigerated pastoral farming. Since the mid-1870's, grains had been grown extensively in Southland and exports of oats had surpassed exports of dairy products and frozen meat in terms of volume although

never in terms of value. Considering the internal trade to the North Island and the considerable amount of oats that were locally processed into various oatmeal products, it is possible that during the grain boom of the Boer War years that the production of grain was the dominant agricultural activity of the province.

The period of prosperity in the grain export trade during the oat boom was in many senses the "Indian summer" of grain production. The decline of oats as a major crop in New Zealand began in 1905. This decline has been traditionally attributed to the elimination of the horse as the main form of motive power. A closer examination of the problems shows that this hypothesis is inadequate. Farm mechanization had barely begun even as late as the 1930's and although the elimination of the horse in urban centres occurred at an earlier date, one has to look beyond the traditional explanation to account for the fall in oat production in Southland. The movement away from grain farming resulted in fewer horses being necessary, so it is apparent that the slight decline in horse numbers prior to World War I could have had little impact on the production of oats.

The exclusion of New Zealand from the Australian market must be regarded as the critical factor. Prior to

Australian federation, each of the various colonies had a separate system of custom duties. Oats were allowed free entry into New South Wales but the other main market in Victoria imposed a duty of three shillings per cental (100 lbs). Adopted in the 1890's, this duty had considerably reduced the volume of exports to that colony. Federation led to the adoption of a common customs tariff of 1/6d. per bushel, a duty that was higher than the Victorian or of any of the other five colonies. The effect of this duty was obscured by the diversion of oats to the high profit South African market but by 1905 the acreages of oats sown began to decline in Southland.

The decline in oat production took place in two distinct stages. First, there was the recession associated with the exclusion from Australia and the collapse of the South African market. Production in New Zealand declined to a level sufficient to meet home demands though any surplus was disposed on a wide variety of overseas markets (table 11).

TABLE 11Destination of Oat Exports 1909-11¹⁴

United Kingdom	84.6%
Victoria	4.2%
New South Wales	8.2%
Queensland	0.6%
Ceylon	0.9%
Other	2.5%

In Southland, the elimination of a steady export trade in oats led to a recession in production. The poorest lands and those that had been continually cropped during the boom years were the first to be abandoned. The railway statistics (figure 27) show that in spite of declining acre-

14. "Trade and Interchange, Exports in Detail," New Zealand Statistics for 1909-1911.

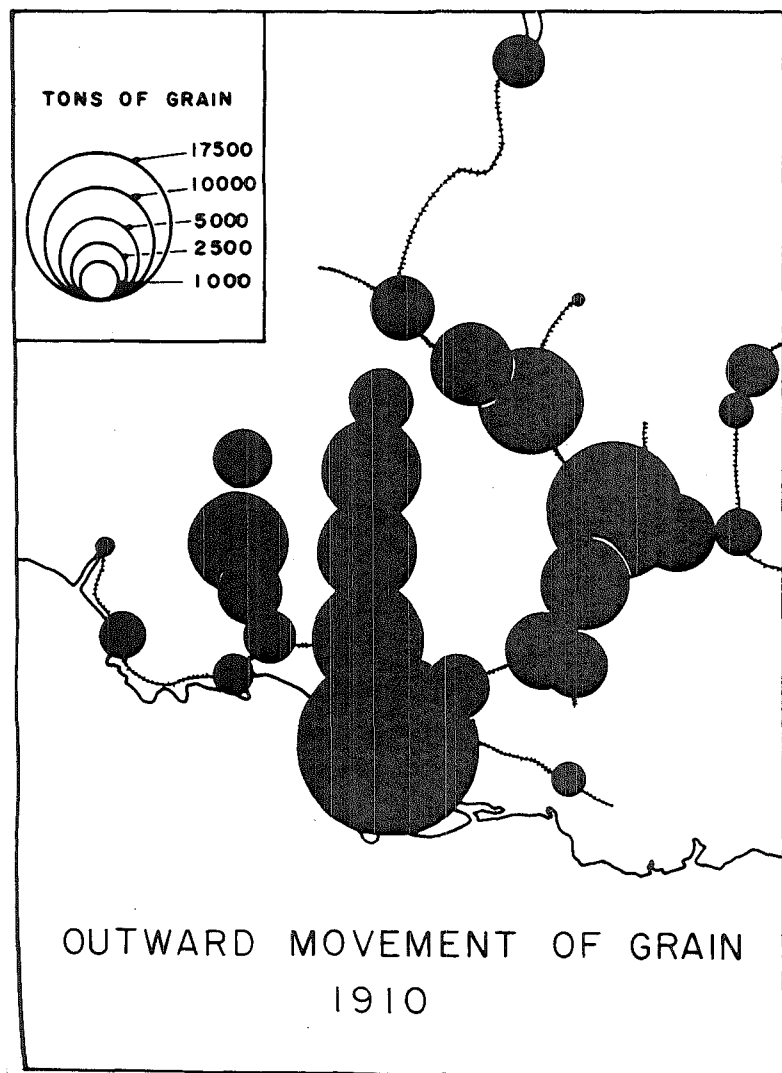


Figure 27

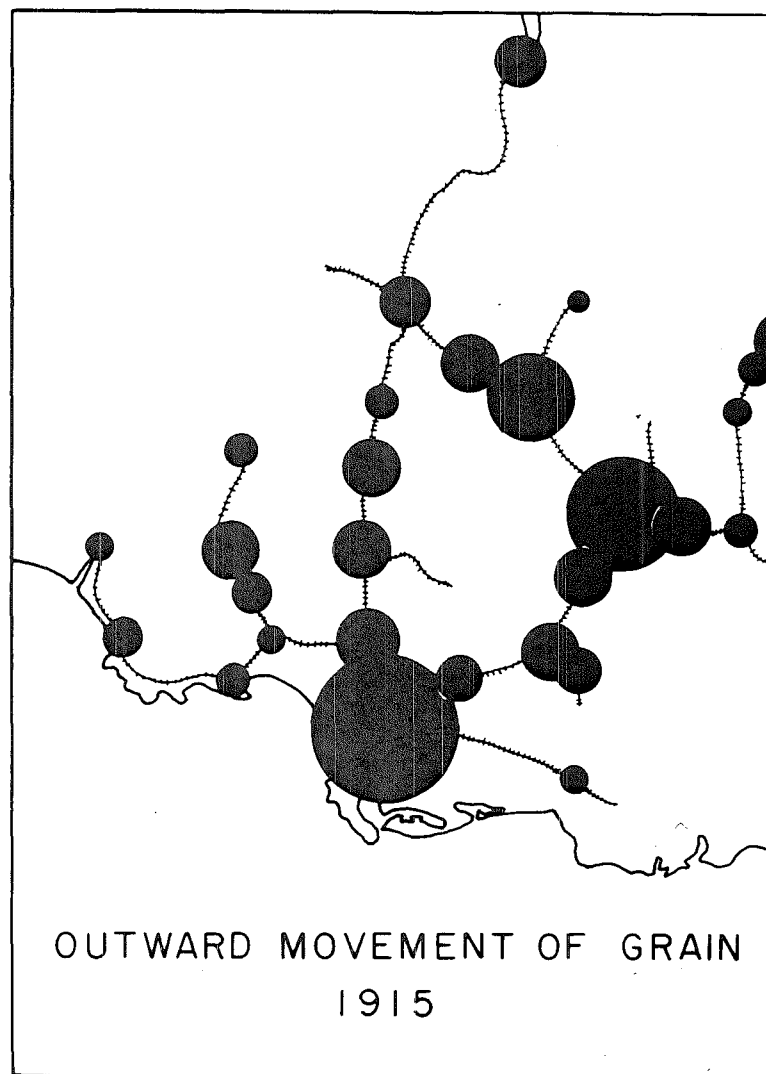


Figure 28

ages in the province, the concentration of grains onto the better lands of Western Southland led to a slight increase in grain handled in 1910. Other data suggests that this slight increase in production was abnormal, a result of heavy British imports of oats in the previous year. The trend in Southland farming was towards a resumption of interest in dairy farming and fat lamb that had been temporarily set aside during the oat boom.

It is informative to note the local reaction to the declining role of cropping in Southland. At first, the Southland Times was enthusiastic. Its rural reporter in 1906 stated that many Southland farmers grew grain out of habit but the season's bad weather made a number realize that "the real profit in farming lay in the pasture and not in the grain."¹⁵ Yet, by 1910 the tide of opinion had swung the other way (though the farmers evidently took little notice of the exhortations of the local press). The newspapers pushed wheat as a suitable crop for local farmers. The hoary myth of cultivation contributing to climatic change was paraded before the farmers. "The chief obstacle to its success in early days had been its liability to get frost

15. Southland Times for March 25, 1906.

bitten" and it was explained that "the gradual drainage of land thanks to persistent cultivation, frost no longer had its terrors for farmers."¹⁶

Wheat was a major crop only near Otautau and in the Cattle Flat district. Increasing numbers of Canterbury farmers were moving into Southland and showed more interest in wheat than did the local farmers. There may be some truth in the theory that Canterbury farmers had a better knowledge of farming practices and that there was "more enterprise in farming shown in the North than in Southland."¹⁷ The Southland farmer was too conservative claimed the Southland Times. The "older Southland farmers are not progressive and that they are too apt to overlook wheat because in times gone by its cultivation proved a failure"¹⁸ but whether this was a sign of unprogressive farming or a sign of farmers refusing to follow a fad cannot be commented on in the absence of more data.

16. Southland Times for January 21, 1911.

17. Southland Times for February 4, 1911.

18. Southland Times for February 18, 1911.

The second phase of the elimination of grain was in the early years of the Great War. This can be partly explained by the general decline in the market caused by mechanization. Motor transport was coming into increasing use in the towns although it had made little impact on the farm. More important was the growing shortage of labour. The harvesting of oats was often done by contract gangs which were no longer easily available as men were enlisting in the armed forces. It was not the lack of a market that caused a shift out of oats. Prices for oats were rising and the threat of shortages forced the Government to place an embargo on overseas exports in spite of similar conditions creating a most attractive market over in Australia.

During the Great War, shifts in agricultural emphasis turned more towards butterfat and frozen meat. These were less labour intensive or employed a greater proportion of family labour than did the grain farm. Trends in the production of grain can be seen in the records of the Bluff Harbour Board which contain details on the coastal and overseas shipment of grain (table 12).

TABLE 12Tonnage of Grain Shipped Outwards From Bluff 1914-1925¹⁹

1914 - 17,196	1920 - 7,637
1915 - 37,723	1921 - 9,967
1916 - 28,871	1922 - 18,530
1917 - 8,517	1923 - 17,427
1918 - 11,773	1924 - 7,120
1919 - 6,924	1925 - 5,691

The wartime slump in grain shipments continued into the postwar era until the onset of the short but severe depression. Since grains in New Zealand depend more on a local market than do other forms of agricultural and pastoral production, prices are less inclined to fluctuate and grain production generally increases in times of economic depression. Eventually, the return of prosperity and the rising tide of dairy and fat lamb farming resulted in forces that

19. Annual Reports of the Bluff Harbour Board.

drove "the cereal grower out of business."²⁰ Grain growing continued to exist in Southland but at a low level of intensity. By 1910, it was no longer a rival to refrigerated pastoral farming. In 1920, it was only a minor element in the Southland agricultural system.

20. Invercargill Daily News for December 10, 1923.

CHAPTER FIVE

THE CULMINATION OF REFRIGERATION 1925 - 1940

5.1 The Grassland Revolution in New Zealand

Perhaps the most glaring omission in the study of the historical geography of New Zealand has been the apparent neglect of the spatial implications of the series of changes in agricultural practices known as the "grassland revolution. Expanding from its core area in the Waikato in the 1920's, the techniques of intensive grassland farming have given the agricultural system of New Zealand much of its distinctive nature, have led to unprecedented farm prosperity and have had an impact on almost every aspect of the geography of New Zealand.

Since work on the grassland revolution has been so meagre, it will be necessary to examine the course of developments throughout New Zealand before examining the Southland situation in detail. As this is incidental to the main focus of the study, though vital to its theme; this analysis will be brief and point out only a few of the major trends so that Southland can be fitted into the national framework of developments in grassland farming.

By the 1920's, the frontier of settlement had reached its maximum practical limits. Agricultural production in New Zealand is the basis of the economy and output could no longer be increased by expanding the amount of land devoted to agricultural production. The closing of the agricultural frontier forced New Zealand into a stage of agricultural maturity. Only through a more efficient and intensive use of the available land could the agricultural sector of the economy expand its export earnings in order to prevent financial catastrophe.

The means by which this could be done within the special opportunities and limitations of the New Zealand environment had been developed in the North Island in the late nineteenth century. Farmers in the Cambridge district of the Waikato had been faced with a number of problems which they had solved through the development of intensive grassland farming.¹ Through most of the nineteenth century, agricultural theory had considered topdressing only in relation to arable farming. There was little knowledge of the impact of fertilizers on grasses and clovers. The effects of fertilizers applied to pasture were startling. By 1900 the

1. D.M. Miller, "Topdressing," N.Z. Journal of Agriculture, Vol. 75 (July, 1947) pp.19-31.

first all-grass farms had been established and within twenty years all cash crops and most fodder crops had been eliminated from the agricultural system of the Waikato and the techniques of grassland farming were beginning to spread into other regions.²

Combining the principles of intensive grassland farming with the best aspects of the traditional forms of animal husbandry, sheep and cattle numbers began to increase rapidly in the late 1920's, paused during the depression, and resumed the increase in the late thirties. Not all regions in New Zealand shared in this early phase of the grassland revolution nor did they all respond in the same manner to the depression which served as both a stimulus to, and a check upon, the spread of grassland farming.

A comparison of sheep and cattle numbers in the various provincial districts between 1925 and 1940 highlights a number of trends. However, to a large degree this table is incomplete since the sheer increase in the amount of stock carried on a fixed amount of land does not tell the entire story. Consideration also has to be given to the startling increases in productivity. Butterfat production per cow in the period under consideration increased from 176 lbs to 218 lbs, lambing rates improved and fat lambs were being sent

2. A.J. Price, "Topdressing, a Waikato Study", N.Z. Journal of Agriculture, Vol.81 (October, 1950), p. 372.

to the freezing works at an earlier age.

TABLE 13

Increase in Livestock Units* 1925-1940³

<u>Area</u>	<u>1925</u>	<u>1940</u>	<u>Percentage Increase</u>
North Auckland	3,339	5,083	51.3
Auckland	4,588	8,693	89.8
Gisborne	3,829	4,110	7.4
Hawkes Bay	5,284	6,227	17.8
Taranaki	2,360	3,023	28.0
Wellington	9,543	11,191	16.9
Nelson	776	840	8.2
Marlborough	1,287	1,363	5.9
Westland	300	331	10.3
Canterbury	5,806	6,189	6.6
Otago	3,759	4,573	21.7
Southland	2,391	3,827	60.4
New Zealand	43,257	55,466	28.1

* Livestock Unit - Dairy Cattle 6, Other Cattle 5, Sheep 1

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3. Table derived from data in the Agricultural and Pastoral Statistics for 1925 and 1940. The boundaries of Gisborne, Hawkes Bay, Taranaki and Wellington have been adjusted in 1925 for compatibility with the 1940 statistical area.

In the limited terms of sheep and cattle numbers, it can be seen that the two extremities of New Zealand predominated in the early phases of the switch to grassland farming. The regional bias is revealed in greater detail in the map (figure 29) which shows the number of livestock units in each county in 1940 and compares the local rate of increase between 1925 and 1940 to the national average to establish whether the area was participating in the switch to grassland farming. Expansion into intensive grassland farming was concentrated in the north of the North Island (North Auckland, the Waikato and the Bay of Plenty), in parts of Taranaki and the Manawatu and in South Otago and Southland.

The initial phase of the grassland revolution occurred on low, flat country with moderate temperatures and a high rainfall. Many of the hilly regions of the North Island (Uawa and Cook counties are typical examples) were unable to participate in the switch to grassland farming until the advent of aerial topdressing in the late 1940's and the eastern half of the South Island was handicapped by a drier climate and the existence of arable cropping as an alternative to grass during the depression. Not only did many of these areas increase livestock numbers at a slower rate but several regions such as North Canterbury saw a marginal

THE GRASSLAND REVOLUTION IN NEW ZEALAND

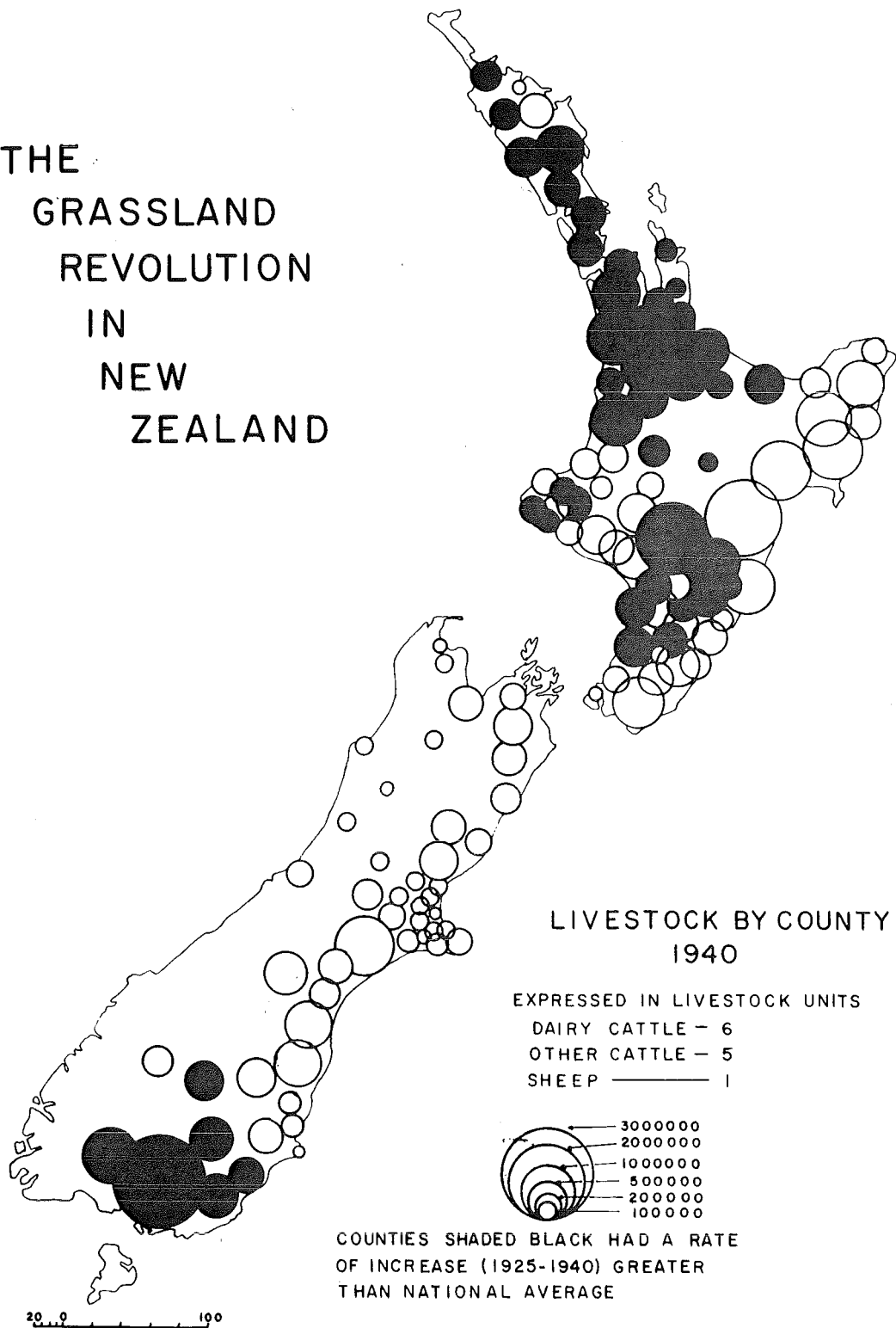


Figure 29

decline in livestock during the period.

The main feature of grassland farming in New Zealand is the acceptance of the principle that grass is the major crop.⁴ The grass is processed as efficiently as possible into dairy products, beef, and fat lamb. To utilize the grass to the utmost, a whole series of changes were introduced into New Zealand farming and taken together these changes comprise the "grassland revolution." The effects of these changes were obvious in the vast increases in carrying capacity but many of the changes were subtle and not easily amenable to small scale geographic analysis. The topdressing of pastures with lime and superphosphates was the main innovation. This increased the quality of the pasture, the amount of grass grown and the length of the growing season. To utilize this grass involved the second main innovation - the development of grassland management techniques where the grass could be fed off, cut for hay or preserved for winter grazing at the most nutritious stage in the grass-growth cycle. To do this, scientific methods began to be effectively applied to the problems of farm management. The develop-

4. E.B. Levy "Intensive Grassland Farming in New Zealand," Grassland Bulletin No. 1 (March, 1949), pp.1-35.

ment of rotational pastures, of certified seed, of cures for bush sickness and of a whole multitude of other major and minor developments all combined to increase the efficiency of the New Zealand farming system.

5.2 Sheep and the Grassland Revolution

Southland accepted the principles of the grassland revolution with enthusiasm for in its particular environmental conditions, intensive grassland farming pointed the way in which production could be greatly increased. Over the course of fifteen years an unprecedented intensification occurred in the agriculture of Southland: an intensification which continues at present and which has made Southland into one of the world's most intensive pastoral regions. In this section attention will be focused on the changes taking place in the sheep industry during the initial stages of the grassland revolution which led to the virtual elimination of the British model of agriculture and the first phase of its replacement with the New Zealand system of intensive grassland farming.

Sheep numbers in the province had reached a low in the 1922-25 period as a result of the post-war depression and the tendency of farmers to switch into dairying or grain during times of economic stress. The following year saw an

increase in sheep numbers and from 1926 to 1930 the growing impact of the grassland revolution was manifested in the rapid rise of sheep numbers (figure 20). In 1930 the increase came to a temporary halt as depression again diverted farmers into dairying and grains. The lack of capital also hindered the changes necessary for grassland farming. But as the clouds of the depression began to lift, stock numbers again resumed their upward trend. Sheep numbers grew at the expense of a declining cattle herd between 1935 and 1938 but after 1938 there was once again a real increase in the carrying capacity of the province.

Unlike the North Island where the grassland revolution saw a growing dominance of butterfat production, the grassland revolution in Southland was characterized by a trend away from dairying and into the production of fat lamb. Although this trend was obscured by the events of the depression, Southland concentrated its expansion in a single direction with the aim of becoming the Dominion's leading producer of fat-lamb for export.

The goal of Southland farming during the grassland revolution was to turn the land "from one sheep country to land carrying four to seven sheep per acre."⁵ The manner in which this intensification of production took place

5. Southland Times for April 4, 1936.

involved the expansion of the available amount of land, the application of the principles of grassland farming to improve the pasture and the principles of animal husbandry to improve the sheep which grazed on the pasture.

The amount of land devoted to agriculture increased slightly as the farmers now had the technical ability to farm all their land at reasonable costs. Mechanization of land clearing and drainage was the key; not the expansion of the frontier into previously unsettled areas. Thousands of farms had an area of intractable bush or a few acres of swampland that had previously been uneconomic to develop. Mechanization allowed land to be cleared at a cost of £2 per acre and the provision of main outfalls and the introduction of ditch digging machinery made useful some of the heavy investment (up to £7 per acre) in drainage during the previous decades.⁶ On balance, this land reclamation because of its greater accessibility and greater potential productivity, more than offset the areas lost through deterioration along the fringing hill country.

Pasture improvement occurred in a number of ways. The use of lime had been an early development in Southland farming practises and its use increased after the first World War. Augmented by phosphatic fertilizers, topdressing allowed the establishment of long-term pastures in Southland.

6. Southland Times for April 13, 1940.

For every ton of lime applied per acre, it was believed that pasture life would be extended from the three years common before 1925 to at least eight and would double the carrying capacity. Eventually using lime and superphosphates a pasture cycle of from twelve to twenty years was obtained on the Southland plains though in the drier areas of the interior the pasture cycle was shorter and it tended to run into Browntop after a short period.⁷

Pasture improvement did not only depend on fertilizers; a large number of other factors were involved. Better strain of grasses and clovers, pasture management through rotational grazing, soil drainage and the steady improvement of soil fertility implicit in grassland farming with its good combination of high quality pasture and a heavy density of stock all contributed to this one aspect of farming improvement.

Of this multitude of fashions in which the pasture was improved so that greater amounts of stock could be grazed, two are of particular interest in Southland. During the first two decades of the twentieth century, Southland had been a major producer of ryegrass seed. Poor farming

7. Statistical Review of the Sheep Farming Industry of New Zealand, Vol. II (Wellington, 1947) p.288.

practices led to the crossbreeding of Italian ryegrass (an annual) with Poverty Bay ryegrass (a perennial) leading to a strain of seed which was condemned as "a valueless product for the making of permanent pasture."⁸ It took a considerable effort to root out the inferior ryegrass from Southland as local farmers resented having their seed crops being refused certification and a major local industry (15,263 acres of ryegrass were harvested in 1920) being destroyed. The evidence that Hawkes Bay certified rye was far superior to local uncertified seed steadily mounted. Increased carrying capacity and a longer pasture life were the result of seed certification and by the mid-thirties there were only a few farmers who refused to accept the benefits brought about by seed certification though it meant the end of ryegrass seed production in the province.

The second major local problem in pasture management concerned the recognition of a cobalt deficiency in many Southland soils, especially those in the Woodlands-Morton Mains district. Experiments conducted in the 1930's at the instigation of the Southland Frozen Meat Company proved the

8. E.B. Hay in Southland Times for May 16, 1936.

benefits of drenching ewes with cobalt. One lambing experiment showed the drastic effect of cobalt deficiency on the value of lambs and ewes. Those receiving no cobalt drench were worth 12/8d. while those drenched before and after lambing had a net value of 25/3d.⁹ The experimental work was conducted in the thirties but the technique was not widely applied until the 1950's. Several farmers have attributed much of the success of the fat lamb industry to the use of cobalt. Previous to drenching, farmers had grazed one or two sheep to the acre, mixed with cattle. After drenching with cobalt, carrying capacities have risen to eight or ten. The use of cobalt exemplifies the careful application of science to farming problems typical of New Zealand agriculture.

The third way in which the production of sheep from Southland could be increased involved the improvement of the machines that converted the grass into fat lamb. A number of breed changes occurred during this period as illustrated in the following table showing the types of rams in the province at five-yearly intervals.

9. T.A. Blackmore, "Discovery and Uses of Cobalt in Fat Lamb Production" in Farmers Yearbook (Invercargill, 1951) p.22.

TABLE 14Sheep Breeds in Southland 1925-1940¹⁰

	<u>1925</u>	<u>1930</u>	<u>1935</u>	<u>1940</u>
Merino	3.0	1.6	0.9	0.5
Lincoln	0.7	0.4	0.3	0.1
Romney	64.2	73.5	60.6	55.1
Border Leicester	21.3	11.6	6.6	3.3
English Leicester	0.9	1.5	1.5	1.1
Southdown	0.4	3.6	23.0	35.4
Corriedale	5.7	3.6	2.9	1.3
Shropshire	1.8	2.7	1.7	0.8

The type of lamb in greatest demand by the English market was known as "Canterbury Lamb", the offspring of a Southdown ram and a crossbred Romney ewe. During the period under review, it is clear that the Southdown ram was rapidly introduced to supply the growing market for fat lamb. The Border and English Leicester rams used for the production of mutton were being eliminated due to a growing British disinclination to eat mutton. The Southdown not only provided

10. "Annual Sheep Returns", A.J.H.R., H-23.

a carcass that was in the greatest demand by the Smithfield market, it also equally served the interests of the farmer. It admirably fulfilled the main aim of the farmer, producing fat lambs which was to have as many early fat lambs as possible. The greater the number of lambs fattened off the ewe, the greater was the farmers profit as supplementary feed did not have to be provided.

Southland sheep farming regions continued to be divided into three.¹¹ During the course of the grassland revolution, the high country home of the merino and other wool oriented sheep breeds such as the Corriedale was steadily being eroded. More of the upcountry areas were being turned to the production of store sheep as replacement stock for the farms on the adjacent lowlands. This assertion can be proved by looking at the number of wethers and dry ewes in the provincial flock. For wool production there is no bias but the number of breeding ewes is a useful index measuring the degree of concentration in the production of fat lambs on store sheep.

11. "Map of the Main Phases of Land Utilization in the South Island of New Zealand," A.J.H.R. (1939) H-29.

TABLE 15Percentage of Wethers and Dry Ewes in Southland 1920-1940¹²

1920	47.1%
1925	18.2%
1930	14.8%
1935	8.3%
1940	7.9%

By 1940, the wool producing breeds were nearly extinct in the provincial area. The only pure wool districts were in the northwest between the Takitimu Mountains and Lake Te Anau and on the slopes of the Eyre and Garvie Mountains. This is not to say that wool was unimportant in the rural economy. The wool clip from the Romney ewes was a major source of income for fat lamb farmers. Many farms on the downlands were producing both store sheep and wool but the basic orientation of sheep farming by 1925 and certainly in 1940 was the production of fat lambs on the Southland plains.

12. "Annual Sheep Returns," A.J.H.R., H-23.

The upland areas became integrated into the fat lamb economy by providing breeding ewes and divisions of the country into the three types of sheep farm can be misleading if the important connections between the hills and the adjacent lowlands and the arbitrary nature of the divisions used are not kept in mind.

A comparison of the distribution of sheep in 1925 and 1930 reveals the areas that underwent the initial response to grassland farming. These two maps show that the areas of greatest densities were still the two old core areas of intensive pastoralism; one located around Drummond and the other in the Otama-Chatton district. The survival of these old core regions as centres for the dispersal of the intensive fat-lamb industry is interesting as they had been the focal points of the switch to frozen mutton production in the 1880's and 1890's. These regions appeared as intense sheep farming districts in 1925 (figure 30) and again in 1930 (figure 31) although with a doubling or tripling of carrying capacity. In 1930, there were 1,200,000 more sheep in the province than there had been five years previously. But the basic pattern of distribution had changed little. Carrying capacities had doubled over the region but the pattern of two cores separated by a prominent trough of low carrying capacities from Invercargill to the Hokonui's persisted. It was the plains that were the most suitable areas for fat

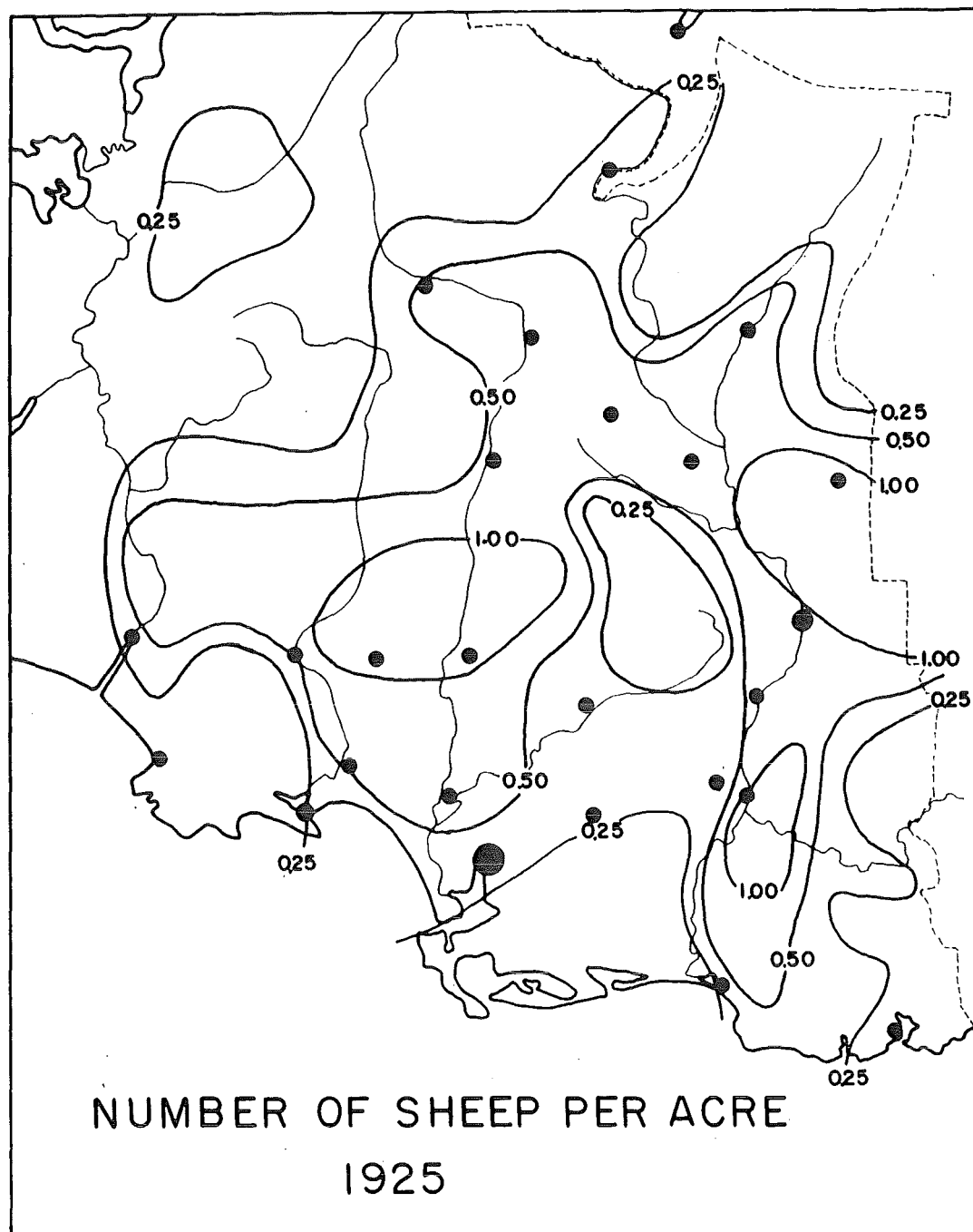


Figure 30

lamb production under the techniques of intensive grassland farming. An examination of the pattern of increase (figure 32) tends to suggest that southern districts nearer the coast increased more rapidly than the drier, inland areas. This is a logical conclusion considering that grassland farming required rapid grass growth, the pre-requisites for which are warmth and moisture.

Southland was in many respects unique in its response to the grassland revolution. The trend to fat lamb at the expense of dairying contrasted with developments in the North Island. Contrasts with other areas of the South Island were even greater. Southland and the adjacent areas of South Otago were the only South Island districts to undergo the "grassland revolution" by 1940. The switch to grass and the changing focus of the sheep industry were atypical of the South Island that was handicapped by tussock grasslands or by a cropping cycle which inhibited the establishment of long-term pasture.

It was not possible to establish all-grass farms in Southland because of the need for fodder crops but the selective adoption of the techniques of grassland farming led to a growing specialization in fat lamb production. The early years of the "grassland revolution" in Southland

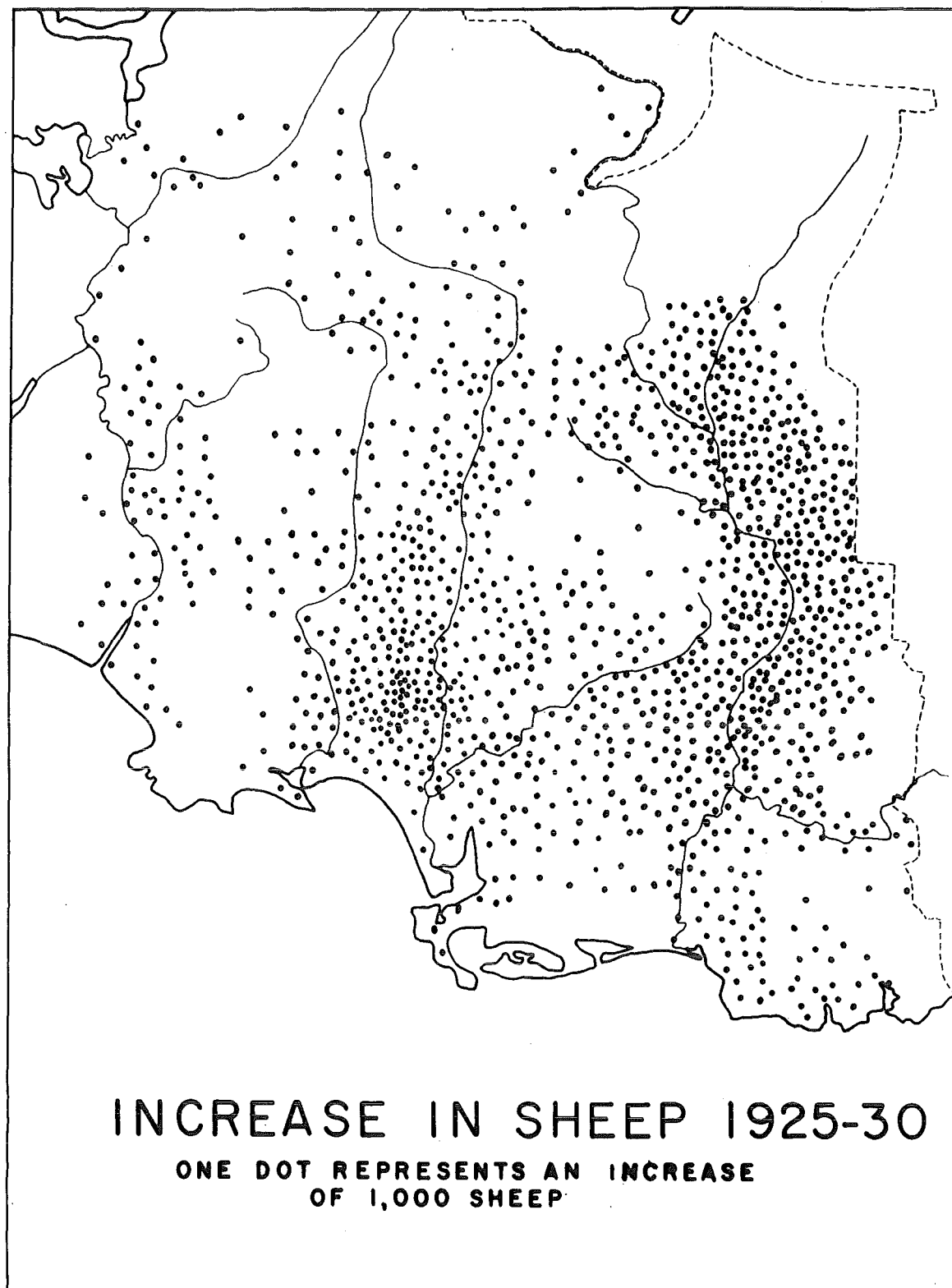


Figure 32

saw a growth in lamb production that at first complemented an expanding dairy industry. The Depression brought a temporary halt to the process of intensification and when it resumed in the late 1930's, the trend to fat lamb continued and began to obliterate the dairy industry.

5.3 Dairy Farming and the Grassland Revolution

The principles of grassland farming were never applied to a great extent in the dairy industry of Southland. Unlike the North Island where the changes of the grassland revolution saw major advances in the dairy industry commensurate with the progress of the fat lamb trade; the intensification of pastoral production in Southland saw a gradual switch from dairy farming to the production of fat lamb.

However, this is not to say that the dairy industry became insignificant nor that the process of decline was a simple matter. During the early thirties, the production of cheese reached unprecedented heights as a response to the depression. Production declined in the late 1930's as more farmers switched into fat lamb, but Southland still remained a significant dairying region.

The changing fortunes of the dairy industry fall into three main periods. Between 1925 and 1930 was an era of rising production caused by the application of some of the

principles of grassland farming and good husbandry. This was followed by a period of panic production during the Depression with a subsequent (post 1935) period of gradual decline.

An examination of the regional variations in the intensity of cheese production in 1925 (figure 26) revealed that the two original core areas maintained their prominent position as the most intensive dairying districts. After the postwar depression, a basic change came over the process of expansion and it continued to gain momentum after 1925. No longer were increases in production caused by the expansion of the number of dairy cows through the conversion of large amounts of land from other uses but to an intensification of production from the better management of herds and pastures.

The areal extent of dairying had reached its maximum in 1925 and the processes of intensification had already begun. It has been noted that the expansion of dairying was relatively faster in western Southland than in the eastern districts. In 1931, the Edendale core had increased its production (figure 33) but not at the same rate as the Thornbury core and other areas. This trend towards a greater dispersal of dairying activity in the late 1920's saw the greatest expansion taking place along the periphery. The forested slopes around the Longwood hills, the South Hillend

area, the fringes of the Awarua swamp and the bush country of the Toetoes district all experienced an increase in production greater than the provincial average.

Production of cheese continued to increase during the early 1930's to reach an ultimate peak of 13,890 tons in 1934. This was the height of the cheese era in Southland but ironically this reflected not a healthy industry but an industry in decay. Increases in production were obtained by farmers who frantically tried to preserve their standard of living by increasing output and reducing production costs. Cattle that would normally be culled were retained, sound pasture management went by the board as imports of phosphates declined and the amount of lime applied to the pasture fell. Production increases were obtained by methods that could only be called a "robber economy".

Data from the 1936-37 season indicates that production had begun to retreat from a number of regions (figure 34). The falls in production were especially noticeable in central Southland between Invercargill and the Hokonui's along the trough of low production that had always separated the two core districts of Thornbury and Edendale. It was in these areas of mediocre soils that the effects of the abandonment of liming and topdressing with superphosphates were most

seriously felt. Production increased in the two core regions since the heavy inputs of capital required by the new style of pastoral farming and the wealth of experience possessed by farmers in these regions provided a base for the preservations of the principles of grassland farming. The comment of the Southland Times that farmers who neglected or were unable to topdress in the 1930's suffered most from the Depression, seems to be validly reflected in the statistics.¹³ The old style dairy farmer, rather inefficient and supplying a small co-operative factory, found it more profitable to abandon dairying and raise fat lamb.

The trend towards fat lamb first took place in the marginal dairy areas since it was more profitable than any but the most intensive dairying. As more and more farmers began to leave dairying, a new trend was noted. Dairy factories began to close. This was unlike the closures in earlier years (figure 35) where a factory closing in one district was replaced by another factory opening in another area of the province. The number of suppliers was declining. There were three hundred and seventeen fewer suppliers of milk to cheese factories in 1937 than there had been in 1931 and many factories had fallen below the threshold of profitable production.

13. Southland Times for April 11, 1938.

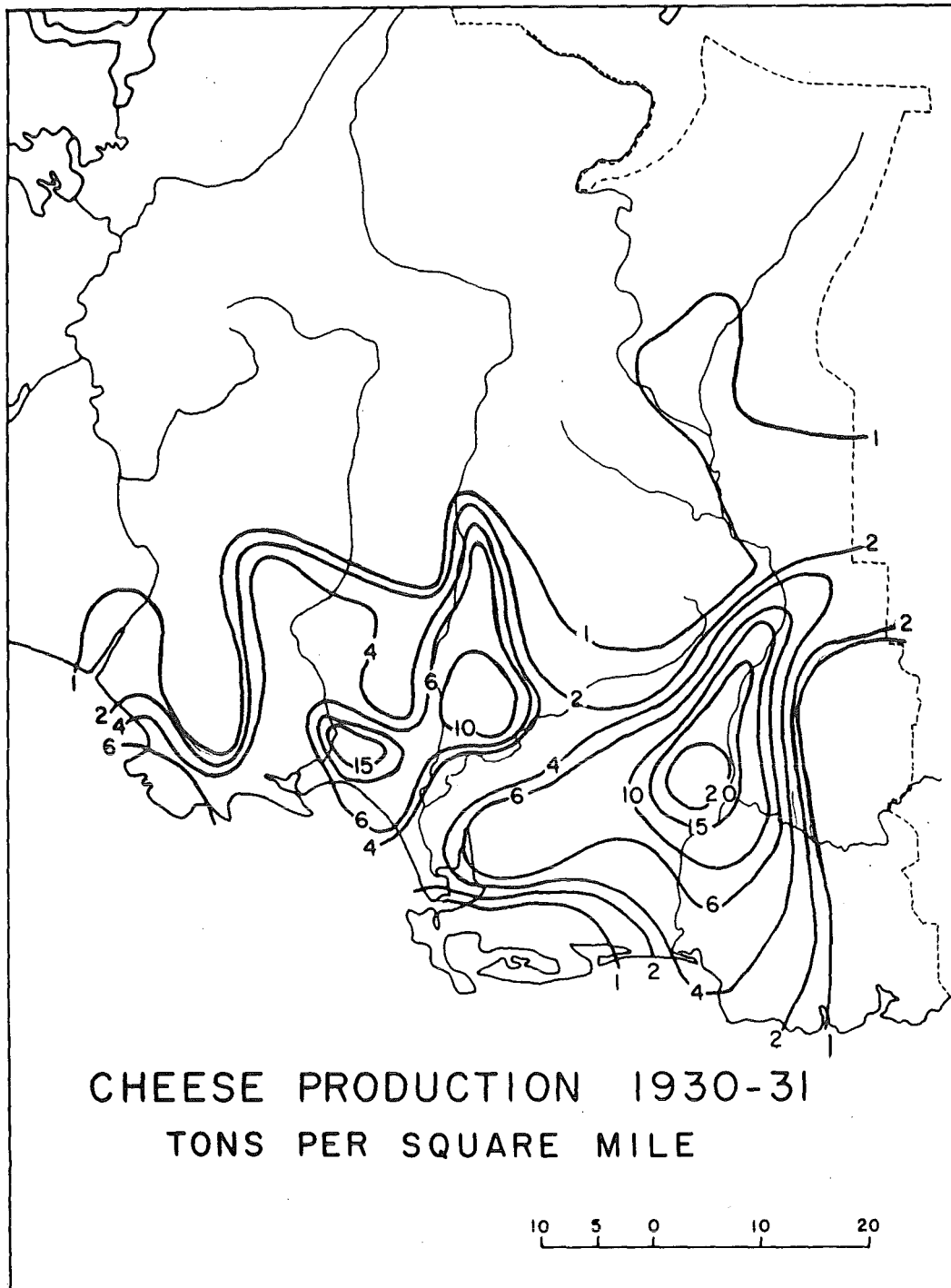


Figure 33

TABLE 16Output of Cheese Factories in Southland¹⁴

<u>Production of Cheese in tons</u>	<u>1929</u>	<u>1931</u>	<u>1937</u>	<u>1956</u>
> 500	2	2	3	1
400-499	1	4	4	2
300-399	7	7	8	4
200-299	7	7	2	6
150-199	8	7	9	9
100-149	18	15	11	6
50-99	9	11	15	2
0-49	6	6	6	0

The trend to sheep began in the mid-1930's once the most severe effects of the Depression had passed. Dairy prices had not fallen as far as the prices for frozen meat and wool but neither did they recover as rapidly. The

14. Annual List of Creameries, Factories, Private Dairies and Packing Houses, Department of Agriculture, Dairy Division.

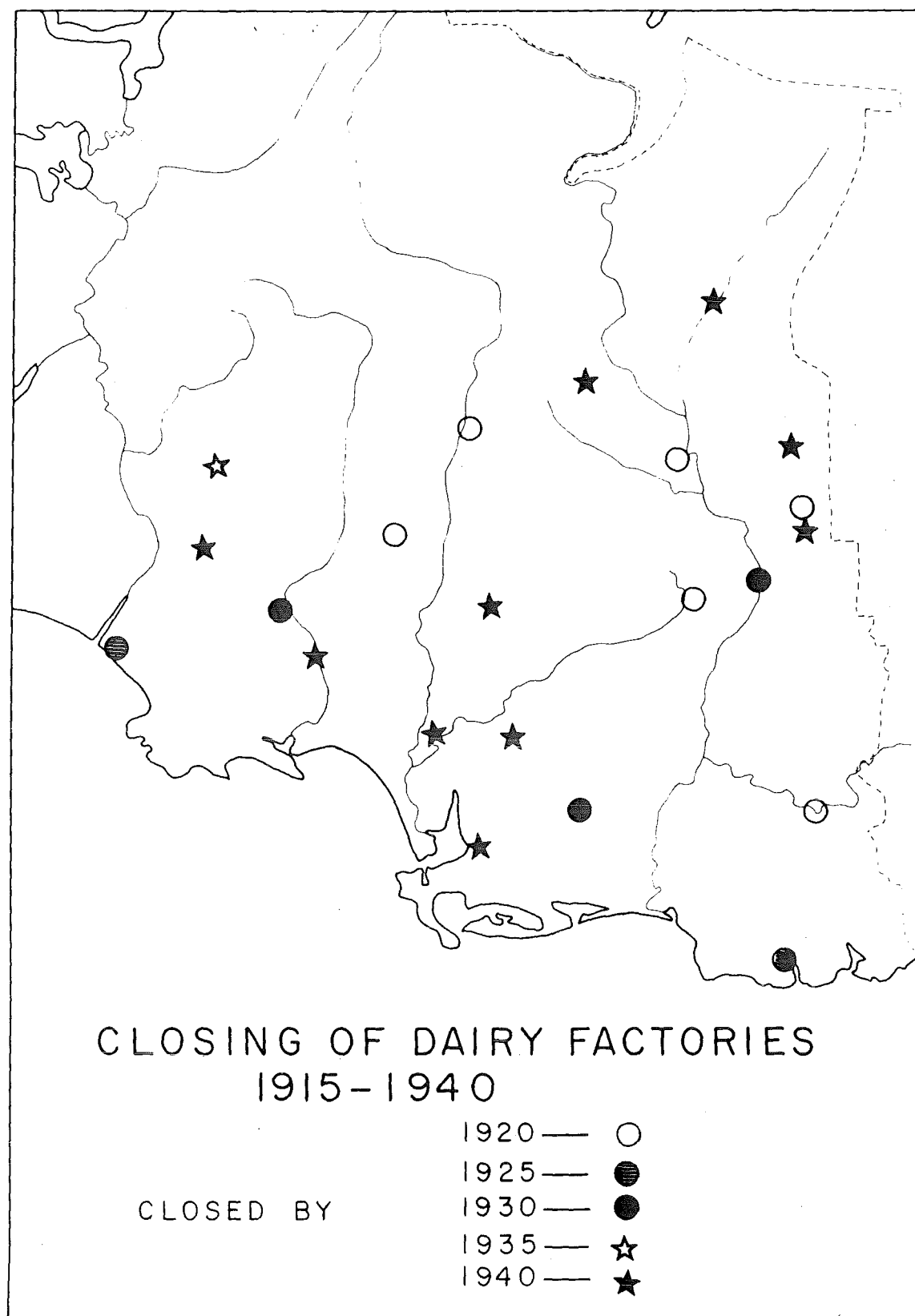


Figure 35

comparative prosperity of sheep farmers attracted many former dairy farmers into the production of fat lamb. This trend was noticeable before the outbreak of the Second World War and gained momentum after the war until dairy farming became a relatively minor part of the agricultural system of Southland.

CHAPTER SIX

CONCLUSIONS

The evolution of the agricultural system of Southland was a long-term process. It has roots that stretch back to Britain before the agricultural revolution and it has not yet ended. Indeed, it probably will never end because agricultural systems are dynamic entities. The aim of this work has been to consider the manner in which the agricultural geography of Southland has reacted to the changes that have taken place in the profitability of various forms of agricultural production, the introduction of new types of agricultural technology, and the impact of new modes of transport.

In the late nineteenth century, Southland became increasingly integrated into the world economic system as a producer of primary products. At first, Southland was a producer of wool (and a limited amount of grain) but the combination of economic depression and the introduction of refrigerated transport initiated the first of the two major "revolutions". The perfection of marine refrigeration allowed the economy to expand and to diversify the range of staple exports. Frozen meat and cheese were added to wool

and grain.

Developments in the 1880's and the 1890's were basically from an extensive, pioneer form of agriculture. The land was exploited and capital investment to increase productivity per acre was rare. But as the new century got under way, the rising profitability of New Zealand farming and the deterioration of the soil encouraged the Southland farmer to practise some of the principles of "high farming." This was done with more or less success although there remained a strong element of conservative and backward farmers in Southland.

To exploit the markets opened up by refrigeration, it was necessary for Southland agriculture to produce a limited range of agricultural products as efficiently as possible. The short but severe economic depression in the early 1920's ended the long period of complacency in Southland agriculture and ushered in the second revolution. Involving the switch to grassland farming techniques that had been developed in the North Island, the second revolution was the culmination of the changes introduced by refrigeration. The switch to grassland farming was temporarily halted by the Depression of the 1930's but by 1940, Southland was becoming one of New Zealand's most prosperous and intensive pastoral regions with a strong specialization in the production of fat lamb for the British market.

The preceding paragraphs have given a brief guide to the temporal changes which took place in Southland agriculture and have emphasized the key role played by two periods of depression in the initiation of agricultural change. Compared to the changes resulting from the depression of the nineteenth century and the severe check to continual, rising prices in the early 1920's; the changes that occurred in times of prosperity were ephemeral. However, the spatial implications of agricultural change cannot be ignored for changes happened neither at the same time nor at the same rate in different regions. There is no single sequence of occupation for the entire province unless it is the summation of the six or seven common sequences that have been observed. The timing and pace of agricultural change varied from region to region. Some areas in the high country tussock zone never changed from the production of wool, while similar areas began to produce store sheep in the early twentieth century. The old arable core on the plains had a different history from either the pioneer bush zone, the tussock dairylands, or the interior arable-fat lamb districts.

In the course of the analysis of the patterns of regional intensity of agricultural production, it was noted that there were two core areas for dairying and two core

areas for the production of mutton. These cores appeared in the 1890's and persisted until at least the 1940's, and possibly still do. While the environment may have played a role in the preservation of these four core regions, they were initiated by, and largely maintained, through historical accident and the capabilities of the early settlers.

The problems of historical geography are complex and it is difficult to speak with certainty on many issues. Many of the conclusions reached throughout the text are only tentative. The reasoning behind them is hopefully sound but it is recognized that more detailed research will probably challenge and upset many of these theories. The sources of data on the agricultural geography of Southland are abundant and only a few have been used in the preparation of this study. Now that the scene has been broadly defined and a general theory of the pattern of the agricultural evolution of Southland has been presented, many further lines of inquiry remain to be pursued, hopefully to cast greater light on the real situation rather than the conditions as perceived through the mists of vague, statistical data and crumbling local newspapers.

SELECTED BIBLIOGRAPHY

A. Primary Sources

Statistical material in New Zealand is scattered through a wide range of official publications. Consulted at various times during the preparation of this thesis were the:

- (a) New Zealand Official Year Book,
- (b) New Zealand Gazette,
- (c) New Zealand Monthly Abstract of Statistics,
- (d) Census of New Zealand,
- (e) New Zealand Statistics - In this series, the sections that were extensively consulted were "Trade and Interchange," "Agricultural and Pastoral" and "Local Authority."
- (f) Appendices to the Journal of the House of Representatives, (A.J.H.R.). There are three sections of these massive volumes that were particularly useful for obtaining statistical data. They are the sections on Crown Lands and Settlement (Papers C-1 etc.), the Annual Sheep Returns (Paper H-23) and the Statement of the Railway Department (Paper D-2). Scattered throughout the volumes are interesting papers on a wide range of subjects but of lesser importance than those already listed.
- (g) Annual List of Creameries, Factories, Private Dairies and Packing Houses. Department of Agriculture, Dairy Division. This annual publication contains details on the production and number of suppliers of every cheese factory in New Zealand. Probably because of the difficulty in finding copies of this publication, it has not been widely used by historical or economic geographers.
- (h) Bluff Harbour Board - Annual Reports.

Among the non-statistical sources consulted in the preparation of this thesis were:

- (a) Cyclopedia of New Zealand Vol. IV Christchurch: Cyclopedia of New Zealand Company, 1905, which contains brief biographies of a large number of Southland farmers.
- (b) The back files of the Southland Times and the Invercargill Daily News which are kept by the

Invercargill Public Library. It was noted that the Southland Times gives a greater emphasis to rural development and was the more useful of the two papers.

- (c) Stones Otago and Southland Directory published annually in Dunedin contains the location of cheese factories in Southland.
- (d) National Archives of New Zealand - a fairly considerable range of files were examined but were found to be of little use for this project. The data that was complete, such as the Register of Agricultural Deferred Payment settlers was too detailed for the scope of the study while the closed files of the Department of Agriculture were either very technical or correspondence of only general interest.
- (e) Valuation Rolls for Southland and Wallace Counties were examined in detail for 1930-32 and 1939-41. These rolls are preserved at the Invercargill District Office of the Valuation Department.

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